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ABSTRACT

The state of Washington studied ways to deliver library materials by mail, with patrons ordering from a Sears-type catalog of materials. Investigation techniques included a literature search, on-site observations, personal interviews, statistical analyses, mathematical modeling, and computer simulation. It was concluded that mail order book delivery could best be supplied through a single state center and that private vendors of catalogs and books should be used if available. This report discusses these procedures and findings and also contains recommendations and technical appendixes. (Author/WH)

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STUDY FOR THE DESIGN OF AN OPTIMUM SYSTEM FOR MAIL ORDER BOOK DELIVERY SERVICE IN THE STATE OF WASHINGTON

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June, 1974

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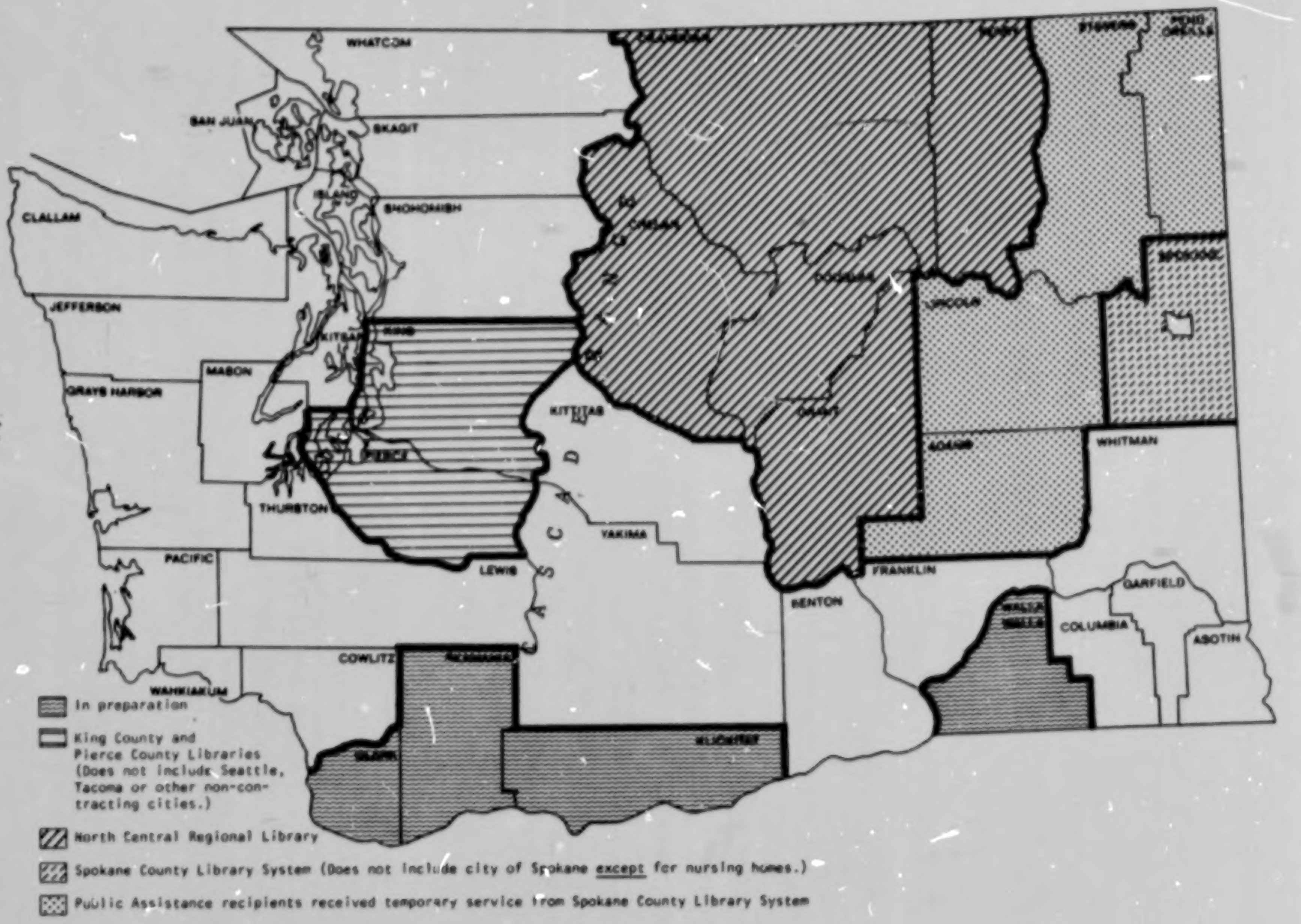
EXISTING MAIL ORDER CATALOG SERVICES IN WASHINGTON STATE, MARCH 1974


WHATCOM
OKANOGAN
FERRY
STEVENS
PEND OREILLE
SAN JUAN
SKAGIT
ISLAND
SNOHOMISH
CLALLAM
CHELAN
DOUGLAS
SPOKANE
LINCOLN
JEFFERSON
KITSAP
KING
MASON
GRAYS HARBOR
KITTITAS
GRANT
ADAMS
WHITMAN
PIERCE
THURSTON
YAKIMA
PACIFIC
LEWIS
FRANKLIN
GARFIELD
BENTON
WALLA WALLA
COLUMBIA
ASOTIN
COWLITZ
SKAMANIA
WAHKIAKUM
KLICKITAT
CLARK
CASCADE
In preparation
King County and Pierce County Libraries (Does not include Seattle, Tacoma or other non-contracting cities.)
North Central Regional Library
Spokane County Library System (Does not include city of Spokane except for nursing homes.)
Public Assistance recipients received temporary service from Spokane County Library System

PREFACE

This study has been undertaken with the support of the United States Office of Education as authorized by the Higher Education Act, Title II-B, Library Research and Demonstration.

Acknowledgment of advice and assistance is owed to numerous individuals and institutions, only a few of whom can be listed here. Helpful suggestions and encouragement were offered by the staff of the Washington, D.C. office and 10th regional office of the United States Office of Education, Bureau of Libraries and Learning Resources. The personnel of the three Mail Order Delivery centers operating in Washington State have been generous in time and information-gathering and -forwarding; this study has leaned heavily on their willing cooperation. The availability of computer services at the Washington State Department of Motor Vehicles and the assistance of Motor Vehicle personnel (especially John Lawson, Assistant Manager, Information Systems; and Richard Carl, Supervisor, Computer Operations) has facilitated the computer simulation of various configurations of operations for statewide service. Hugh T. Vrooman, Manager, Systems Analysis and Management Services, Illinois State Library, and consultant for this study, provided valuable technical assistance, especially in computer simulation procedures. Kristy L. Coomes, Library Specialist, Washington State Library, contributed considerable effort in gathering data and in control of the report's production. Other members of the Washington State Library staff contributed design and editorial advice to the study.

Genesis of this study came from the directors of district library systems of Washington State, at a meeting in August 1973. The topic of serving users via mail order delivery (MOD) was discussed. The experiences of the three centers in Washington (King-Pierce Counties, North Central Regional, and

Spokane County) using this device were so positive that other directors were impressed to the point of considering the application of this technique in their own systems. The State Librarian, Maryan Reynolds, suggested that the ramifications of extending service to all the state should be studied, to determine how the goal might be best achieved.

The directors of the district libraries charged the investigators with the task of supplying information on alternative patterns for library mail order delivery to serve patrons throughout the state. This study was undertaken to evaluate present methods in the districts now offering mail order library services, and to provide information on which can be based decisions on number of centers, operational techniques, cost projections, organization for ongoing policy and fiscal control, and methods for periodic evaluation.

This report is organized as follows: First, following this preface, an abstract is provided. Next is a short introduction, after which procedures and findings are discussed. A section describing conclusions and another listing recommendations conclude verbal description. A selected bibliography, exhibits, and appendices complete the report. Many readers will find the abstract and conclusions sufficient for their needs; others may wish to read the mid-portions of the report, and a durable few may wish to investigate the appendices which offer technical support and detail but are not necessary for understanding the study and recommendations.

ABSTRACT

This report describes an approach to the problem of how best to service the citizens of the state of Washington through delivery of library materials by mail, with patrons ordering from a Sears-type catalog of materials. Investigation techniques included literature search, on-site observations, personal interview, statistical analysis, mathematical modeling, and computer simulation. This report discusses these procedures and findings and also contains recommendations and technical appendices.

INTRODUCTION

The primary question enunciated in the district directors' meeting is whether all districts will be best served by one MOD center, or by some larger number of centers; this project is intended to determine some parameters of the most likely form that such a service system might take, providing facts and analysis on which the directors' decisions can be based. The charge for this study does not include a cost analysis of mail order versus other methods of service, though some figures of this nature are included herein. Mail order delivery service is not seen as a substitute or competitor for the range of services available to a walk-in library patron; rather, on evidence of experience it is felt that MOD service reaches patrons who would otherwise be unserved. This study does not address the question of the most efficient way to supply materials for library users, but investigates the problem of the most efficient pattern of mail order delivery, to extend service to certain types of citizens who are now either unserved or served with difficulty.

While this study was designed to offer answers to a specific problem, it is recognized that many assumptions not questioned demand investigation. Some of these are mentioned later in this report, in hope that at some future time the necessary funds and energy might be available.

The initial approach to the study was made through a literature search, to gather information on experiences in mail order delivery elsewhere. Reports were gathered from mail order delivery services throughout the country, and from the Conference on Books by Mail Service, sponsored by the American Library Association in Las Vegas on 23 June 1973. From analysis of these reports, information was drawn to be compared with findings related more closely to Washington State.

The three existing mail order service centers in the state of Washington were examined on-site. Directors and staff members were interviewed, financial and statistical data were collected, and subsequent telephone calls and letters elicited additional information as required. There has been no attempt to study the systems from the users' viewpoint, nor to assess the collections qualitatively, though these inquiries are recommended for subsequent action. The efficacy of mail order delivery service has not been questioned, since the charge given for the study was based on a positive desire to extend such service to all or most of the state. The problem addressed has been which organizational pattern can best achieve statewide service.

In addition to the three on-site observations of mail order delivery centers, the investigators interviewed a number of Washington State librarians, who provided helpful information and guidance. Furthermore, the Fort Vancouver Regional Library (Vancouver, Washington) began during the course of the study to offer mail service to portions of its service area. Considerable up-to-date information had been accumulated by the library's assistant director, John Legry, and this information was made available to the investigators.

Experience in Washington State has formed the backbone of this study, and information from elsewhere has served to corroborate or modify the findings in Washington. Out-of-state operations which were especially considered included operations in the states of Vermont, Pennsylvania, and New York.

Analysis for population scatter and educational level in the state was based on the 1970 U.S. Census and figures published by the State Office of Program Planning and Fiscal Management.

A major factor in the quality of any mail order service is the behavior of packages in the U.S. Postal System. While the internal operations of the working centers offered a means for analyzing costs of such service, an analysis of mail delivery patterns was necessary in order to assess rapidity of service to the user. For an empirical test of postal delivery patterns, the three existing centers mailed packages to district library directors throughout the state, keeping records as to times en route from center to home and return.

The methods for this study have been of a traditional nature with the exception of computer simulation. The classical techniques included literature search, on-site observations, personal interview, statistical analysis, and mathematical modeling. The statistical and mathematical data provided input for the simulation model which described the interrelationships of components and procedures of the mail order delivery systems in a format that could be processed by computer. The generalized model was constructed on the basis of systems at the three presently operating centers, and the model was exercised to simulate service to the state's MOD library users from various alternative configurations of centers.

PROCEDURES AND FINDINGS

LITERATURE REVIEW

Before the decision to undertake this study, a literature search was made to ascertain whether the desired information might already be available. While a recent study in Pennsylvania (Hu, 1973)[1] had investigated the relative merits of bookmobiles and mail order delivery, and the report had implied that a statewide MOD service might best be organized from one center, this large-area pattern had not been directly addressed. Also, the Vermont State Library had begun a mail order delivery service which was to expand to cover the state, but there had been no analysis of what might be the best organizational pattern; intuitively the one-center concept was used. The other states with some activity but little available evaluative information are New York and Illinois.

The two ALA conferences on this subject, one in San Francisco in 1967 and the second in Las Vegas in 1973, demonstrated strong interest throughout the profession. This is also documented by the publication of Tomorrow's Library; Direct Access and Delivery, (Jordan, 1970) a thorough presentation of the history, current status and future of such service programs.

The literature review revealed two basic types of service patterns: the mailing to a patron of any available book requested, and a Sears Roebuck style system with special mail-order catalogs, staff, and collection. In this study, mail order delivery (MOD) refers to the latter pattern only. The strong opinion of the staffs operating present mail order delivery services in Washington is that a well-designed catalog with illustrations and good annotations is the main factor in building circulation. This aspect is emphasized by Robert Jordan.

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[1] Full citations are given in Bibliography, pp. 45-46.

> "It is no coincidence that the low cost ($2.00) book catalog distributed without charge by Sears, Roebuck is an integral and essential part of the nation's model...retailing operation. Few of the thousands of retail mail order services (representing every conceivable type of commodity and service) could exist without a catalog. *Similarly, it is unlikely that a direct access and delivery library service can successfully exist without a catalog.*[2] Collectively, the libraries of the nation have the capacity to develop patron-oriented book catalogs comparable in potential to commercial catalogs." (Jordan, p. 74)

Mail order delivery is a relatively recently developed technique for library service. The literature search made it clear that most mail order delivery systems do not publish evaluative or statistical reports, or thorough descriptions of operations. However, the North Central Regional Library in Wenatchee, Washington, which established its mail order delivery system in 1968, has maintained early and on-going evaluation programs. As a contribution to the profession nationally, this has been most beneficial, and in the present study the data are invaluable.

FINDINGS FROM OTHER STUDIES

The 1973 study for the State Library of Pennsylvania by Hu, Booms, and Kaltreider, compared bookmobile and mail order delivery cost-benefits. Some of the data from that report can be employed in the present analysis as a basis for arriving at a reasonable range of costs for mail order operations. Table 6.13 (Hu, p. 202) in that report gives per circulation costs for eleven libraries throughout the U. S. After eliminating those for which incomplete information is given, the cost figures for seven centers, as given in Exhibit 1[3] of this study, show considerable agreement. The monthly circulation figures have been calculated from figures given in the Pennsylvania study for longer periods of time. If each of these seven cost-per-circulation figures is multiplied by the corresponding monthly circulation figure and that total is divided by the total circulation for the seven operations, the mean is then calculated at $ .65. As stated on page 204 of the Pennsylvania study: "...a cost per book circulated of $ .60 to $ .70 is a good estimation of what libraries considering the establishment of a MOD service can expect in the way of operating costs." This could be used as a general measurement for existing mail order delivery operations, so long as there is some attempt to calculate costs on a fairly standardized basis. Carrying the inference a step further, a standard deviation of $ .06 can be related to the $ .65 average cost. If this can be accepted as reasonably valid, it will provide managers with a rough measurement of the cost area in which a mail order center should operate: one standard deviation above and below the mean will give a range of $ .59 to $ .71. If the cost per circulation for a given operation lies above $ .71, investigation should reveal ways of reducing costs--or some special services may be included which would make the general level of cost inapplicable. This range must of course be modified as monetary values change; even at the present writing, in early 1974, some upward revision should be made: the Monthly Labor Review reports the Consumer Price Index for January 1974 as 11.5% higher than the Index for 1972, which brings the upper limit of the range to $ .79, since the calculations are based on 1972 cost figures.

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[2] Italics supplied.

[3] All exhibits are contained in

Exhibit 2 shows graphically the figures in Exhibit 1 and the above calculated range of cost expectations. Exhibit 3 shows the possible existence of a curved rather than a straight-line estimate of costs, with higher cost-per-circulation related to lower circulation figures. This is one of the hypotheses underpinning the present study, and is further supported by data gathered in the Washington state MOD operations and analyzed later in this report. This is mentioned but not analyzed in the Pennsylvania report: "The findings here seem to imply that a large (statewide) operation will result in lower costs than can be obtained by having many (local) MOD operations." (Hu, p. 231)

Some further comments on the Pennsylvania study should probably be made here. The benefit figures constructed by Hu, et al., should be questioned. They result from inquiring of users how much time is saved for them by the bookmobile or MOD service, how much they would be willing to pay for the service, and the number of books they would buy if the service were not available, and estimating from frequency of use and income how much time is saved for them and what it is worth. The price users would be willing to pay would seem influenced by how much they think the specific service costs, and bookmobiles look more costly, and are more prominent and self-advertising. How many books would be bought might well be exaggerated in the same manner as the usual reader's estimate of the number of books read; so also might frequency of use of library services. Hu, Booms, and Kaltreider are to be lauded for attacking the benefit analysis problem; the above comments are intended not to disparage their findings but to offer a caveat.

The Pennsylvania study concludes that while cost per book circulated by bookmobile is less than cost per book for MOD[4], the benefit for MOD is higher (Hu, p. 275). The derived benefit/cost ratios for total costs are .58 (.36/.62) for bookmobiles and .65 (.45/.69) for MOD service.

In the analysis of marginal costs for bookmobile and MOD services, one additional circulation for bookmobiles would cost $ .14 while an additional circulation via MOD would cost $ .01. "Unlike the case of bookmobiles, it appears practical to increase the scale of MOD operations." (Hu, p. 231) And on page 288: "...the figures used in this study may be underestimates of the actual cost of operating a bookmobile."

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[4] This is contrary to the experience of the North Central Regional Library in Washington, as described on p. 9.

Perhaps the most startling recommendation in the Pennsylvania study is that advocating user charges for both bookmobile and MOD services. Pennsylvania users of both indicated a willingness to pay $ .22 and $ .21 respectively per book borrowed. (Hu, Table 8.7, p. 257)

The report on the Las Vegas Conference on Books by Mail Service (Kim, 1973), indicates the potentiality of such programs for reaching the hitherto unserved. In rural areas this unserved segment may amount to from 10 to more than 50 percent of the population, the report points out, whereas in urban areas the unserved are perhaps 4 to 6 percent ("homebound, elderly, institution-bound, and people who work during the library hours"). This is at least partially substantiated by experience in Washington state: the North Central Regional Library serves a predominantly rural population and has built an ever-growing readership, while the two centers serving individuals close to urban areas have not yet been able to elicit an equal response. In terms of circulation per catalog mailing address, the North Central system shows an average of 7 items per year against 2.5 and 3.7 respectively for King-Pierce Counties and Spokane County mail order delivery programs.

The Pennsylvania study relates a cost factor to this urban-rural balance; population density affects bookmobile costs much more than it does MOD costs. "Thus, some bookmobiles have to travel a good deal further to get a reasonable level of circulation, and thus cost per unit is very much higher for some operations." (Hu, p.204) This is not true of MOD operations: "...unlike transportation costs for bookmobiles where costs are a function of distance, postage rates are a flat rate based on weight and do not vary by distance"

(Hu, p. 204). This was paralleled by findings at the North Central Regional Library, where bookmobiles were serving the sparsely scattered population at a cost per circulation of $1.05, while MOD cost per circulation was $ .73 for the first 8 months of MOD operation and now stands at $ .64. It would seem that many people in urban districts can get to a library or at least to a bookmobile stop, and that bookmobiles are efficient in the urban situation where stops are frequent and each stop reaches more people. This present study concentrates on MOD service to the light-density rural population, plus the elderly, housebound and institutionalized in urban areas--those members of the total population who experience difficulty in reaching the library building. It is not considered that bookmobile and MOD services are competitive, but rather that they are different methods of service, with varying economic efficiency under various circumstances. It is in the rural service areas that bookmobiles have proved more costly than the MOD approach. With the onset of the necessity for economizing on gasoline, the balance may tend henceforth toward MOD service, even in more densely populated areas.

Another interesting finding of the Pennsylvania study: 62 percent of MOD users who responded to a questionnaire had borrowed from a library in no other way within the preceding year, as against 55 percent of bookmobile users giving the same response (Hu, p. 154). Of these, 71 percent of the MOD respondents and only 50 percent of the bookmobile respondents did not feel they could use a library's material if MOD/bookmobile service were not available. "If the objective of these two services is to reach the disadvantaged (meaning users who would otherwise be unable to use a library service because of distance, location, or time), then...it seems that MOD is more effective than bookmobiles" (Hu, p. 9). (The definition given for disadvantaged should be expanded to include the housebound, such as physically handicapped and aged.)

A further implication here is that MOD is not in competition with regular library service. As stated in the Las Vegas conference report:

> There is a growing evidence that both rural and urban books by mail programs are in fact helping the use of standard library services in the same and/or nearby communities. In some cases the books by mail program was instrumental in making people want a regular library in their community. Thus, the books by mail program is complementing rather than competing with (let alone replacing) the existing standard library services. (Kim, p. ii)

MOD service is a supplementary service for those who cannot avail themselves of the full service of an established library, and has also (specifically in the North Central Region of Washington) provided the inducement for development of new local libraries.

The report from the Las Vegas conference (Kim, 1973) attempts to amalgamate a heterogeneous set of attitudes as represented by the participants in that conference. Some statements seem highly questionable: "Rural reading interests are found to be largely in the areas of recreation, pleasure, home and family life." And "Urban books by mail uses reflect to a large extent the general reading interests of the regular library users in the local area where, in sharp contrast with the rural reading, non-fiction reading predominates." (Kim, p. i) Since these statements were contrary to the expressed impressions of staff in the mail order centers of Washington, as well as other library personnel, an analysis of the state's total circulation figures was made. Predominantly urban areas showed non-fiction titles to be 50 percent of total circulation, while rural areas showed 44 percent non-fiction. The disparity of 6 percent seems insufficient to warrant the statement in the Las Vegas report. Perhaps the generalization is more pertinent elsewhere; Washington has one of the highest average levels of high school completed in the nation, and the level of average grade completed does not vary greatly between urban and rural. (Exhibits 4, 5, 6, 6a). Urban areas are indicated in Exhibit 9.

Findings of the reports at the Las Vegas conference relative to costs are that staff costs may be on the average 30 percent of costs in a rural program and 50 percent in an urban program. The second largest cost factor is the collection cost (a median of 24 percent)--it is not clear whether this is inclusive of start-up cost, or whether start-up is amortized over a number of years. Third ranking cost factor is production and distribution of catalogs--a median of 12 percent of total costs. Comparable figures for Washington's MOD centers are given in Exhibit 7, with start-up figures in Exhibit 7A.

MOD IN WASHINGTON STATE

During the month of October 1973, on-site observations were undertaken at the three extant mail order centers in the state of Washington.

The internal operations of all three centers were very similar, probably due to the fact that the North Central Regional Library's early pattern had been highly successful and could readily be adapted by the more recently starting centers. There were some differences in policies on overdue materials and in files that were kept, but overall procedures were basically the same.

The staff members in all three centers were enthusiastic about their service and enjoyed the feeling of accomplishment which they derived from the work. Misgivings were expressed as to the advisability of a one-center statewide system for mail order: a question of whether size would create inefficiency, possible delay in processing so many new books, concern for special reading needs and interests for each area of the state, large backlogs of reserve lists for high-demand titles, book selection and annotation as requiring local know-how. While some of these objections have possible validity, they have not been heard from other librarians with whom the study has been discussed--which leads to the surmise that these people in the mail order centers are happy in their work and want to continue it rather than be supplanted by one center to serve the entire state.

Monthly circulation for all three centers is shown in Exhibit 8. The Spokane and the King-Pierce operations each circulate materials at a much lower rate than does North Central, which also shows a lower cost per circulation than do the first two. It seems possible that the greater throughput and experience of North Central's operation will account for much of the cost differential; though the higher rate of throughput may have implications for the usefulness of MOD services in urban or metropolitan areas.

The services appear to be successful, as judged by reports of user appreciation, continued requests, growth of allied services (i.e., reference) and demand for further local services. This success and enthusiasm are the factors which led to the request that the present study be made.

Reports on the three visits are given in Appendix A.

Under present funding patterns, all but 4.5 percent of Washington State citizens are said to be served by public libraries--which should mean that nearly all Washington citizens could expect convenient access to library resources and information services for their self-enrichment, economic well-being and entertainment. In actuality, a considerable portion of this group that might be library users are denied the opportunity to benefit from their tax investment on a fair and/or equal basis, because of domicile location or other factors preventing travel to a library.

It is the assumption of the library profession in Washington State that the totality of library information and recreation services in the state is a statewide resource which, as with the education system, should be sustained and made available equally and fairly to the maximum degree possible in the public interest, and that a continuing program should exist to enhance access for all funded citizens to library resources. One technique for enhancing such access is the ordering and delivery of library materials by use of the postal service.

Washington librarians are agreed that while the service is not an adequate substitute for strong comprehensive in-library programs, mail order delivery service does fill a clear need for specific individuals who cannot for various reasons come into the library, and furthermore is not in competition with regular library services but instead promotes the use of the libraries' other services. It is viewed as one of a gamut of techniques which enable library materials and services to be made available on a relatively equalized basis to all citizens regardless of location. This study does not question the value of this supplementary library service; the problems addressed are how and where does it fit in the gamut of services, and how it can be achieved most effectively on a statewide scale.

STATISTICAL STUDIES

Demographic Data

Demographic factors must play a major role in any statewide mail order delivery service, as they do in library service in general. For purposes of this study, data were desired relative to the state of Washington: population spread, the urban-rural distributions, education levels, and library statistics. Since the study seeks information on possible divisions of the state into areas covered by MOD service centers, the data is related to each county, assuming that divisions will be on county lines or that other segments can be approximated from this data. The reduced data are shown in Exhibits 9 through 14, and will be referred to later in this report as their information is pertinent. Sources for this information are listed in the Bibliography.

One segment of the population which could benefit from a statewide MOD service would be those persons living in areas presently unserved by libraries. Exhibits 12 and 13 display that segment as 153,755, or 4.5 percent of the state's population; twelve counties are members of no library district, and 50 municipalities are without public library service.

In addition to these obviously unserved persons, there is in the total population a hidden unserved group who are unable to access the library even though they live in a "served" area. A substantial number of persons in areas with library service, where per capita expenditures average $5.69 statewide, are unable for various reasons (distance, disability, etc.) to benefit from the investment of their tax moneys in libraries. Mail order delivery service can enable them to exercise the privileges to which they are entitled: MOD will aid in equalizing library services among taxpayers.

For the 4.5 percent unserved shown in Exhibit 12, a state-level supported MOD system can supply some library service. For the hidden would-be users in the served areas, MOD can be a strong assist, whether state or locally-supported.

While the majority of the state's population is concentrated in the area between the Cascade Mountains and the Pacific Ocean, the majority of rural postal boxholders is located on the eastern side of the mountains. According to projections for population growth, the western corridor will become more and more densely populated as the years go by--which should mean more city delivery routes there and fewer rural routes which are currently the primary service points for MOD.[5] Thus the requests for MOD services can be expected to originate increasingly from the eastern part of the state. The areas of sparse population, where a higher ratio of people find libraries inaccessible, are the service grounds for MOD. It might well be added here that bookmobiles would seem better justified financially in urban areas where more people can be reached with few and close stops. The long distances to be covered to serve a few people in the rural areas will make bookmobiles there more costly; while this dichotomy was not spelled out in the Pennsylvania study, there are supporting implications therein.

U.S. Postal Service Data

A second set of factors, in addition to the demographic, which are external to a mail order delivery system but which must affect plans and operations of such a system, have to do with the U.S. Postal System. One of the major ingredients in a mail order system, and one of the least controllable, is the speed of postal delivery. Librarians experienced in mail order operations emphasize the necessity for consulting early and often with the local postal authorities, to be sure that their attitudes and routines will enhance the service. There are problems of forms to be filled out for special postal rates, tactical schedules for delivering packages and catalogs to the post office, the support which can be given by postal employees who understand the significance of the library service they are aiding in, efforts which the MOD center can make to avoid causing disturbance in postal routines, etc.

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[5] See Exhibit 14.

To derive latest accurate information for this study, interviews were held with U.S. Postal customer service personnel in Olympia. An additional source of information was the U.S. Postal Service Instructions for Mailers.

One factor which must be considered in planning the location of any major mailing operation is the pattern of primary mail-handling points. A mail order delivery center which is located in a community served by a primary mail point, so that mail can be taken directly to a primary mail point and received directly from a primary mail point, will gain about a day in mail time over a center which operates through a secondary mail point (i.e., a post office which receives and distributes mail only after sorting at the primary point). The primary points for the state of Washington are located in Seattle, Everett, Tacoma, Olympia, Wenatchee, Yakima, Pasco, Spokane, and Portland, Oregon, and Lewiston, Idaho. Exhibit 15 shows the areas served by the main points. Actual delivery to Seattle, Spokane, and Tacoma addresses is through a separate handling rather than directly from the primary center.

Patterns of mail delivery to households is an important factor in distribution of mail order catalogs. Mail addressed to "Occupant" or "Box holder" without full address goes under a low postal rate, and also costs less in staff time for preparation to mail.

Federal postal regulations prohibit the mailing of non-addressed materials on city postal delivery routes unless the mailing source is a state, county, or municipal agency.[6] In Washington, since library districts are special districts and not part of county government, this will prevent use of this technique for city residences unless the MOD center is a state-level organization, or unless such mailings are made under the auspices of the State Library. However, on the basis of experience in the three present MOD centers, the planning for MOD service should be concerned first with rural areas where a higher portion of the population has difficulty accessing a library because of distance. There is some question whether broadside distribution of catalogs in urban areas will be worth the expense, even if non-addressed residential delivery is used. The proportion of active user responses can be expected to be much lower than for rural areas, possibly due to the proliferation of other communication and recreation resources. This does mean that an intensive effort would be necessary in urban situations, to make the MOD service known to people who might use it so that individual mailings of the catalog will be requested. For purposes of planning catalog distribution we must be primarily interested in rural routes. The number of rural routes by county is given in Exhibit 16. Data for post office boxes are also included, though use of this means of distribution is not recommended except in rural areas without delivery services, because of the number of boxes held for commercial purposes--again, the proportion of "live" responses seems too low to warrant the expense, particularly in the more predominantly urban areas.

An approximation of potential circulation can be derived by comparing total circulation against number of households receiving catalogs. For North Central this is 109,415 annual circulation, with catalogs going to 15,624 households, or a circulation of seven items per household receiving catalogs.

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[6] See U.S. Postal Service, Instructions for Mailers, p. 122.412.

This projects to a statewide annual circulation of 1,408,274. Using King-Pierce figures, we have 2.5 circulations per receiving household, or a statewide projection of 502,955. With Spokane figures: 3.7 circulations per household receiving catalogs and statewide projection of 744,373.

Probably for counties which are primarily rural and those currently unserved by library districts, the ratio of 7.0 can be used, while for urban counties the figure of 3.1 (averaging 2.5 and 3.7) may be more accurate. The rationale for such a difference lies in the fact that even though households may receive mail on a rural route, in an urban county they are likely to be much closer to a library than in a rural county, and closer to urban "distractions," therefore the single factor of distance will induce a higher response from residents of a primarily rural county.[7] Using this differential and using figures for boxholders in urban and rural counties, we have Exhibit 19, giving a projected statewide rural circulation of 926,421.

To this figure must be added the urban residents who should receive catalogs because of inability to go to a library. These potential users will be difficult to reach; they will be required to take the initiative in establishing themselves as users. The MOD service must be widely advertised (this is a marketing operation) so that the housebound will become aware of its possible benefits to them. The number of such potential patrons has been extrapolated to be 152,522. Since they are so difficult to reach, the ratio actually receiving catalogs is estimated at 1/3, or 50,841. These are individuals rather than households. If we have a state average annual circulation of

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[7] Possibly some "rural routes" are actually suburban, and will offer low response to the catalogs. If a method is built into the MOD operation so that statistics on specific routes' responses can be tabulated, such low circulation routes might be dropped from the distribution pattern, with the individual users maintained on a personally addressed basis.

4.6 items per household receiving catalogs, and each household averages 3.1 to 4.6 persons per household (1970 U.S. Census figure for Washington State), this gives an average annual circulation of about 1.5 items per individual. The estimated 50,841 housebound individuals receiving catalogs would on this basis add some 75,000 items per year to the rural circulation figure of 926,421, for a total annual circulation figure of 1,001,421. This does not assume 50,841 housebound users, but that of these individuals receiving the catalogs, some lesser number would request 75,000 items of the MOD center.

The final postal service factor has to do with specific patterns of delivery in Washington. That is, do distances or geographic obstacles or other factors extend the in-mail transport times, and if so how much? The Olympia postmaster estimated that mail would be delivered anywhere in the state within one to three days. For an experiential test of the postal delivery times, and to gain some indication of possible differences to and from various points in the state, a set of sample mailings was undertaken. Ideally, mailings would have gone from each district library to every other district as well as within each district. However, because the three mail order delivery centers were equipped for such mailings without much prearrangement or disruption, books were sent only from each center to the home addresses of each of the directors of the district and major municipal libraries, a total of 19 addresses throughout the state. Home rather than library addresses were used to approximate the type of delivery patterns which would apply to books sent to patrons. Each package included (1) a book, (2) a return label, (3) stamps, and (4) a form for recording the date sent from the center, dates received and remailed, and date received back in the center. Three packages were sent to each address from each of the three centers, on a Monday, a Wednesday, and a Friday, to take weekly delivery and transport cycles into account, and the mailings were completed in late October to avoid entanglement in the post office's Christmas rush. The forms used in the postal study, addressee locations, and the raw data, are given in Appendix B.

Most of the library directors received their mail by residential rather than rural route delivery. However since there is no indication of a differential between city and rural delivery times, the figures are used to indicate in-mail transport periods for general areas of the state, whether addresses are urban or rural. In this and other interpretations of data, which are similarly indicated in this report, the investigators adopted a Bayesian approach, adding to the sample data further information already possessed about the sample, putting experiential data into the inferential process.

Comparing the mail times to the entire state from each of the three centers, no statistically significant differences appear: any one of the operating centers (or presumably any other primary mail point operation) will serve equally well to get materials out to patrons quickly in terms of mail times.

The mailing time from each center to home addresses throughout the state averaged two days for each center with 95 percent of the items arriving at destination within four days. The return times were longer, averaging three days for each center with 95 percent of the items delivered within six days at King-Pierce and Spokane and within eight days at North Central (Exhibit 20). The differential between outgoing and incoming mail times is presumably a reflection of the centers' systems for delivering outgoing packages to the post offices (all primary distribution points) at scheduled shipping-out times, compared with delays in residential pick-up and transport of the return packages.

It was hypothesized that the Cascade Mountains dividing the state from north to south might be such an obstacle to mail transport that the establishment of one center for serving the eastern side and one for the western side might be mandated on the basis of delivery speed alone. This hypothesis was only partially supported by findings. Separating the recipient addresses into those east and west of the Cascades, Exhibit 21 shows mail patterns. The figures for North Central and for Spokane show no statistically significant differences; both are on the east side of the mountains, and means for the east side (3.1 and 3.2 days) and for the west side (5.2 and 5.4 days) are very similar. The mean times for King-Pierce, however, do show statistically significant differences from those for the other two centers. King-Pierce's mean mail time for the east side is 4.6 days, a significantly larger figure than those for the two eastern centers (1½ days longer, which means two full days with mail delivery only once per day), and for the west side is 3.6 days, a significantly smaller figure than the other two (again, a difference of two days mail time saved). These two days are absorbed by both the outgoing mail to patrons and the packages returned from patrons--the returning mail times are actually important only when a title has a reserve waiting list; otherwise, an extra day or two in the mail transit will have no effect on circulation of the item or operations at the center.

Analyzing outgoing mail times from the three centers to locations east and west of the Cascades, ignoring return time, we find no statistically significant differences among the service times of the three centers to all the state. Similarly, when tested for service to addressees on the eastern side of the state, there is no statistically significant difference among the three--that is, each of the three would serve the entire state or the eastern side of the state equally well. When tested for service to the western side of the state, one comparison did show as slightly significant: that between King-Pierce and Spokane. Both King-Pierce and North Central would achieve delivery to patrons on the west side of the mountains with no statistically significant difference in time, but calculations indicate that Spokane would deliver in a significantly greater time. The term statistically significant must be emphasized; the mean difference is actually only one day. This may or may not be considered significant by the administrators making the final decision as to MOD service configuration for the state. Certainly it is not weighty enough to carry the decision alone, other pieces of evidence must be taken into account and may be much more influential in the decision.

An assessment was made of whether the delivery times within the immediate areas of the three present centers are sufficiently better to warrant an inclination toward the establishment of an MOD center for each library district. Again, the statistical evidence is inconclusive. The mailing times for the three centers within their own areas were combined; Exhibit 22 shows the data. No significant difference was found between the time for delivery in the local area and time for delivery on the same side of the mountains for each center. For each of the three centers, time for a book to be delivered to the patron in the local district is slightly improved over the time for a book to go elsewhere in the state. However, since all the average times are more than one day and less than two, they would all predict a two-day transit time for 50 percent of the patrons; practically speaking there is no difference. Taking standard deviations into account, we can see that for service to the entire state from any one of the three centers, 68 percent of the packages will be delivered within three days and 99 percent within four days. For the local area, 95 percent will arrive within two days and 99 percent within three days. Again, this one day differential may or may not seem significant to decision-makers; it is simply additional information on which to base the final choice.

Cost of service might be weighed more heavily than whether 50 percent of the patrons have to wait an extra day for their books.

While there is evident a gradation from the rapidity of delivery within the local area, to a bit slower throughout the center's side of the Cascades, to the longest times being required for points beyond the mountains--still the averages differ by only one day, and the aberrations for longest times in transit seem to relate not at all to distance (or any perceivable factor--random occurrences in the postal system are a rational explanation).

Analysis of the test mail data leads to the finding that there are no clearly significant differences in the dispatch of mail from any of the primary postal points in the state to serve the entire state, merely some shades of difference which might or might not pertain in the final weighting of pros and cons for choosing the MOD service configuration. The tentative conclusion must be that if other factors point to the wisdom of establishing two or more MOD centers to serve the state, at least one should be located east and one west of the Cascades. However, if one center seems most cost-effective, then the degree of cost differential to speed delivery by one day to cross-mountain patrons must enter the final decision on number of centers. And if one center is to be the final choice, then location should depend on costs for space and personnel in various primary mailing points of the state, and the location of most of the population it will serve.

Cost and Work Flow Data

Exhibit 23 shows a comparison of data relative to circulation and cost for each of the three presently operating MOD centers in Washington state The last column offers rough estimations of data for a statewide operation. The total annual circulation figure for statewide MOD service was developed on the basis of rural delivery services and estimated housebound users (Exhibit 19). The calculation of circulation per household and per individual addressee is based on experiential data from the three MOD centers, as are the ratio for items per package mailed, the number of items processed annually per employee, and the cost per circulation. It should be noted that calculations are based on a paperback collection; the addition of other materials such as films and cassettes will increase costs.

Exhibit 25 gives expenditures ratios for the three Washington MOD centers during 1973, broken into major categories, and Exhibit 7 displays the proportion of each against each dollar expended. The statewide estimated expenditures shown in the final column of Exhibit 25 are derived from estimated data in Exhibit 23 and experiential data in Exhibit 24. There is considerable risk in extrapolating from the experiential data, since the proposed statewide service would experience a work flow about ten times the magnitude of North Central's. For example, average salary per employee was calculated at $7,000; this may be low, since such a large operation would require a higher-salaried manager. At the same time, the ratio of clerks to administrators might be higher than in a smaller operation. Again, the discount received on book purchases is not definite and would only become precise as actual negotiations with vendors ensued; an additional ten percent (perhaps too low) was used as increased discount for large annual purchases. Supplies and miscellaneous were estimated on a rough ratio of the total expenditures. Postage for North Central comes to an average of $ .30 per package and this figure was used for postage costs. Catalogs for both North Central and King-Pierce cost $ .054 each; this might be reduced to $ .045 on the basis of 251,182 copies, four times a year.

Data on internal work flow and times for operations were supplied by the three MOD centers. There has been an attempt to remove from the King-Pierce data the times for handling cassettes and films, as these are more time-consuming than paperbacks and the other two centers do not circulate these materials via MOD, except as special requests. The work load data supplied by the centers is used in the simulation model, and derived time data is used to establish functions for modeling the statewide system.

SIMULATION

The problem to be solved is essentially one of an organization's performance to achieve stated objectives within specified constraints: minimum cost for specific performance, maximum performance for specified cost, or some optimum balance. Often the problem is extremely difficult or impossible of solution by conventional techniques. Analytic approaches are effective but it is not unusual that in such approaches the problem is oversimplified or the necessary data unavailable. The use of intuition is sometimes resorted to, with obvious shortcomings. Often it is inadvisable or impossible to test a set of alternative systems in practice or to perturb an existing system in order to compare results.

A better approach when system indefinition exists and information is difficult to obtain directly is to attempt to construct an analog, a computer model with which a real world situation can be simulated and the action of different system variants compared. Simulation may be a useful tool when design problems are complex, poorly defined, and mathematically unpleasant. Complexity usually arises from the relationship between the components of a system and the process algorithm; that is, the interdependency of components and state variables cannot be fully described by analytical expressions nor reduced to easily solvable functions. Purposes and procedures in the system are inadequately understood and considerable study is necessary to reach a definition as to the essentials of the system. Such study may be not feasible because of concomitant time and money expenditures. Mathematical unpleasantness is apparent in both the difficulty of expression necessary for analysis and in the inadequacy of available data. Inappropriate data is usually abundantly available; useful data is scarce and there is always some doubt as to its accuracy.

Simulation is a tool and the use of it is an art, demanding constant effort on the part of the analyst/designer to understand the problems, goals, and energy expenditures needed to effect an efficient or useful-in-context system. Computer simulation can aid in problem definition, factor relationships which influence design, measure sensitivity of the design to the change of system load parameters, predict alternative systems' performance, and aid in selection of final design from among alternatives.

The representation of the system, the dynamic analog, its rules and relationships, is defined as the model. The exercise of the model under various specific conditions is defined as simulation.

Model construction forces the designer to state explicitly his understanding of the system. Once a coarse model of the overall concept has been established, even though system insight be weak, by using speculative data ranging over the expected operational spectrum, areas of sensitivity can be noted as well as modifications necessary to bring system performance to specifications. By using the same work load and the same time interval, and altering process algorithm or construct, alternative systems can be compared by reference to work output levels. Or, as in the present study, an ideal system can be constructed from existing operations and the effect of increased work loads can be observed, comparing alternative levels of load.

Once the model has been developed and confidence established that it is a valid description of the real system, then a series of parametric simulations can be run to gain understanding of system behavior and to gain feeling and insight into the effect of proposed changes that only system manipulation and operation can otherwise provide. Through the use of simulation, this exploration can be undertaken while the redesign is still a paper concept.

For the purposes of this study, the mail order delivery model was constructed on the basis of data derived from the three existing MOD centers in Washington State. Processes and functions were observed and discussed with the staffs, and work flow diagrams drawn up (Appendix C). Procedures at the three centers were sufficiently similar for construction of a common model. King-Pierce handles a variety of media; the model reflects book service only, since this is a common denominator and the relative costliness of other materials probably excludes them from a start-up program for statewide service.

On the basis of information supplied by the centers, a set of data on each center was built: quantities of orders and packages, and ratios of types of requests (items listed or not listed in the printed catalogs, items with reserve waiting lists). Each center supplied the times for processing each step of the operations. Design of the model permits these blocks of information to be interchanged in sequential computer runs.

The model was coded in Flow Simulator (FLOSIM), a Univac adaptation of IBM's General Purpose Simulation System (GPSS), and was run on a Spectra Series 70/45 computer. FLOSIM performs logical operations to simulate the flow of transactions (in this model, orders, books, and packages) through facilities (workers and machines) in processing steps related to time units. Thus the model shows incoming packages and orders, the filling of orders for various types of requests and packing and shipping. The program listing is given in Appendix C; functions for rate of requests and packages and for processing times were calculated, coded, and input for each of the modeled situations.

First runs of the computer model simulated present MOD operations:

1. North Central Regional Library
2. King-Pierce County Libraries
3. Spokane County Library

Comparison of the results of these three runs with actual operations of the centers provided validation of the model. To determine the most efficient operation for use in the simulation of all-state service, the procedural times for each of the three centers were simulated against a standard workload. The workload for North Central was used as a standard, so that run 1 provided the needed results for North Central.

4. King-Pierce County Libraries work times against standard flow
5. Spokane County Library work times against standard flow

Comparing the results of runs 1, 4, and 5 showed that the operating procedures and times of the MOD center at NCRL required fewer personnel to cope with the standard throughput. Therefore, the model incorporated these procedures and times for simulating the hypothesized configurations of state service, with workloads calculated on the basis of demographic data and experience of patron response at the present MOD centers. The following runs simulated the statewide service situation, each for one center to serve the area designated. These divisions were drawn so as to balance somewhat the populations served by the centers. See Exhibit 26 for delineations of these areas.

6. All state
7. Area east of Cascade Mountains (East, W & E)
8. Area west of Cascade Mountains (West I, N and S, and West II)
9. Northern section of west side of state (West I, N & S)
10. Southern section of west side of state (West II)
11. Northeastern part of area described in 9 above. (West I, N)
12. South and west part of area described in 9 above. (West I, S)
13. Eastern section of east side of state (East, E)
14. Western section of east side of state (East, W)
15. 1/14th of state: average operation for 14 centers covering all the state

Since each of the present district libraries is a possible service center for its own district, their hypothetical operations were modeled. It should be noted that some areas of the state remain unserved under this pattern, since the districts do not cover all the state--run 15 is not a representation of the average district operation. The three present MOD operations were not included in this final group of simulations.

16. Asotin County Library
17. Fort Vancouver Regional Library
18. Kitsap Regional Library
19. Mid-Columbia Regional Library
20. North Olympic Regional Library
21. Sno-Isle Regional Library
22. Timberland Regional Library
23. Whatcom County Library
24. Whitman County Library
25. Yakima Valley Regional Library

Each computer run simulated the operation of a specific MOD center for a period of a month. At the end of the run, printed output reported on the condition of the model. Sample computer outputs are shown in Appendix C.

Personnel requirements for the functions modeled are calculated from the facility tables. An average of .7 utilization as a full-time equivalent for each of the facilities (employees) in the computer model is conventional for personnel calculations. This allows a margin for non-productive activities, and experience in operations research has shown this to be a valid ratio. Therefore, the sum of utilization of all facilities for a given process is divided by .7 to derive the number of staff needed for the function. The model does not include tasks related to acquisitions, catalog production, and administration. Because these supporting functions (with the exception of administration) are possible candidates for vendor contracts, and because they are not complex mathematically, they were analytically modeled rather than incorporated in the dynamic computer model.

Exhibit 27 shows the man-years required for each of the configurations modeled. Column A gives man-years as developed in the computer model, plus administration; column B shows man-years as needed if all support functions (selection, ordering, receiving, processing, catalog production, and mailing) were to be accomplished at each center rather than centralized or contracted to a vendor. If centralized, support functions for the entire state, with up to five centers in operation, would require seven man-years.

Thus one decision factor is somewhat clarified: if a vendor bid for one or all of the support functions is less than the costs projected for those functions, then there are financial advantages in a vendor contract. In other words, for centralized support functions the costs can be projected:

salaries	$ 49,000
catalogs	50,000
postage	94,000
supplies	5,000
space costs	1,000
	$199,000

Therefore the center's manager should seek a vendor who offers to supply the functions of ordering, receiving, and processing new materials, and producing and mailing catalogs--all for less than $199,000. Similar tables can be constructed for the separate functions, on the basis of data in Exhibits 23, 28, 29. Since the investigators were not in a position to ask vendors for solid bids on such contracts, comparative costs are not given in this report. However, if the decision is made to establish mail order centers, this is a major factor which could be readily defined for purposes of staffing and contract decisions. There are indications from at least one reputable vendor that an attractive arrangement could be made. If selection and annotation are contracted to a vendor, the administrator of this operation need not be a graduate librarian, but could be a manager reporting to an overseeing board of librarians.

Exhibit 28, derived from the projected loads for each of the simulated centers, shows the projected costs for statewide MOD service for situations of one to fourteen centers. Estimated costs rise as the number of centers increases, with the total circulation held constant.

Since the district library directors of Washington were interested in the possible establishment of district MOD centers (a desirable alternative in terms of local user-library relationships), the computer model was used to simulate the ten hypothetical MOD operations. Sets of data were developed on the basis of demographic information for each district, with the same task performance times as were used in the simulation of the statewide operation.

Manpower estimates for the districts were derived from the computer output; these estimates are shown in Exhibit 27. The total staff to serve the districts (including present MOD operations) totals 52 man-years: sixteen more than needed for one center to serve the entire state. Additionally, as can be seen in Exhibit 28, even with support tasks centralized, the cost of the district centers is estimated to be $683,400--$72,700 more than one center serving the entire state and $65,600 more than two centers.

It must be noted that the data for the statewide operation includes all citizens of the state, while these for the districts include only citizens in the areas currently served, excluding patrons of municipal and association libraries, counties not included in library districts, and the 4.5 percent of unserved citizens. If the total projected statewide circulation were allocated among the fourteen districts, to compare with the situation of one to five centers serving the entire state, a model representing the "average district" shows that fourteen centers serving the entire state would require a staff totaling 63 man-years (Exhibit 27)--27 more than needed for one center and 20 more than for five centers serving the state. Estimated costs would be $718,500--$107,800 more than one center, with support functions centralized so that the fourteen centers serving the entire state would require a staff of 42--thirteen more man-years than for one center and nine more than for five.

This information should assist in defining optimum approaches to mail order delivery service for the state of Washington. Should decision-makers require additional information which the model can supply, the computer program is stored and is readily available for further exercising. For example, if the administrator of one of the present centers should consider expanding its area of service, new traffic data can be input to the model to forecast personnel needs for the added load. Or if procedures are to be altered, the model can be adjusted to reflect the change and its effect. Furthermore the model can be used for other states or regions, with data based on local information, and is readily translated into other versions of the GPSS language.

It is not possible to generalize comfortably to other states' situations vis-à-vis optimum mail order delivery patterns. There is considerable evidence that a single center would be most efficient in many instances (state or region of several small states). However, the major factors present in Washington may fall into different relative perspectives in other states, with values that result in different decisions. The model can be used in a variety of situations; the input data must be derived for each in terms of demographic, library, geographic, postal, etc., information. It is necessary to rewrite or modify the model itself only if some different pattern of operations is planned. The procedures modeled are basic to the form of mail order delivery operation envisioned and practiced in Washington.

CONCLUSIONS

This study has investigated methods for providing mail order delivery of library materials to many citizens who cannot ordinarily access a library. Such a service would utilize special facilities: work area, staff and collection, with presently established libraries as backup for titles not included in the printed catalog sent to patrons. The catalogs would be mailed quarterly to rural route addresses and to other individuals who might request the mail service.

It was anticipated that one or a few centers could serve the entire state more efficiently than could one in each district library or some similar multiple set. Centralization should result in economies of scale in the areas of collection costs (greater discount for larger annual purchases) and catalog production (annotations cost less when made only once per title, and printing costs per copy are greatly reduced in large quantity production). The budget items for staff salaries and physical facilities should also show economies in a large centralized MOD operation, compared with a number of smaller operations. Heavier traffic should permit more efficient use of personnel in the organization. Space for a given number of books (say 200,000) should be less if they are shelved in one continuous area than if each of ten locations stores one-tenth of the books, given that some surrounding space is necessary in each location for staff operations and movement of personnel.

The investigators did find that estimated costs increased as more centers were introduced. One center could serve the entire state at an estimated annual cost of $610,700, while the estimated cost for two centers would total $617,800, and for five centers, $643,100. There are of course other factors to be considered in the decision, such as a slight time lag in delivery (one day, for 50 percent of the patrons on the opposite side of the Cascade Mountains from the center).[8] The individual library might enhance its local image by mounting such a special service--this factor must also be weighed in the decision balance against the fact that separate district MOD services, not covering the entire state, would cost an estimated $683,400 per year.

One of the major components of the proposed mail order service is the printed catalog. Minimum cost per copy is important, since the provision of four catalogs a year to some 250,000 addresses throughout the state is one of the largest segments of the budget for this service. A promising approach to this problem is that of vendor service. At least one paperback vendor advertises his services as catalog producer for mail order operations. This question was beyond the scope of the present study, but it seems probable that such commercial services might prove more economical than MOD-center-produced annotations and catalogs; this possibility should be investigated. The catalog cover sheets could be printed separately for various districts, to advertise specific libraries or offer other information applicable to that area. The vendor could also mail catalogs directly to patrons.

Procedures for receiving books and preparing them for the shelf should be kept to a minimum. Processing can consist of no more than an ownership stamp and an identifying number for each title; a vendor could provide shelf-ready books.

Selection of titles might also be assigned to a vendor. While a librarian can perform selection expertly, this seems an overqualified level of personnel for the task. The character of the MOD service is such that current demand is the major factor in title selection, rather than the librarian's usual criterion of long-term collection building. Since all books in all libraries are backup for the MOD center(s), the MOD collection(s) can contain only those titles listed in current catalogs; that is, the collection should consist of much-in-demand current titles, subject to constant weeding as titles cease to move. A vendor in the course of his own management must maintain awareness of the probable demand for various titles; book selection for the MOD collection might be assigned to such a vendor on the basis of a profile establishing proportions of various types and subjects of books. Adjustments or special requests could be made from time to time; this procedure might well prove efficacious and less costly than the time of a librarian.

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[8] It is reasonable to assume same-day mailing of a requested book, if that title is on the shelf when the request is received. Subsequent to the internal efficiency of the mail order center, speed of delivery to the patron is dependent on the U.S. Postal system.

Should the directors decide in favor of local MOD operations, and should vendor contracts prove unfeasible, there are still some methods which can help hold costs to a minimum. Economies could be realized through the establishment of an ordering and processing center for the state, with materials and catalogs shipped from that center to as many MOD centers as are wished. That is, a vendor would give a larger discount if all orders were placed from one location. A central processing operation should increase efficiency, by readying many copies of the same book for the shelves and providing one annotation to be used by all centers. A uniform catalog to be used by all MOD operations would result in considerable savings; preparation of separate catalogs would increase total annual costs by an estimated $7,000. Sharing one catalog necessitates a uniformity of book ID numbers and some standardization of procedures. The major objection here will be that selections and annotations made for statewide consumption do not serve the local readership as well as those made by a knowledgeable local librarian; these tasks might be rotated among participating libraries.

When a request arrives for a title not in the mail order collection, there are at least two main alternatives:

a) refer the request to the library nearest to the center and most likely to hold the title;

b) refer the request to the district or municipal library nearest to the patron.

The first alternative would lead to an overloading of certain libraries; the second would spread the load, with the district or municipal library either filling the request or referring it through customary channels. Another alternative, that of purchasing the title for the mail order collection, should be considered in light of the fact that this may be the first of a number of requests for the same title.[9]

Automatic ordering of many duplicate copies for every title, as is done in some MOD centers, is wasteful when there are methods for analyzing demand in advance, and thereby varying the number of copies bought between, say, 2 and 20. The three MOD centers in Washington State report that many titles never have more than two or three copies in circulation at one time.[10] Thus for these operations three copies might be the standard order quantity for new titles. Weekly analysis of reserve lists could indicate the need for acquisition of more copies of the most requested titles.[11] The pattern of paperback publication permits foreknowledge of the popularity of most titles, since the market behavior of the same titles in hardcover is evident during the previous year. Also, there are lists of best sellers in paperback--the New York Times Book Review Section, for example, which are strong predictors of high demand titles. A conservative policy on duplicate copies would seem advisable, with reliance on local booksellers or telephone/airmail for acquiring extra copies to meet unexpected demand.

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[9] Whatever method is adopted, a notice should be sent to the patron, explaining the situation and approximate delay time.

[10] The centers also report that only 10-13% of requests were placed on reserve waiting lists.

[11] Management information for this decision could be derived through computer modeling (Arms, 1974).

Library operations, in general, would benefit from applications of marketing techniques--and this is especially applicable in a mail order delivery operation. The display of wares for the public's choice has an obvious parallel with a mail order catalog, and the MOD center's operation closely resembles that of a mail order warehouse. The profit motive is lacking, but the basic purpose of moving as much merchandise as possible pertains in both instances. Librarians planning and managing such an operation might investigate techniques and theories used in the business world--for example, it should be possible to analyze the "reader market" as an onward-developing situation, to gather information for decisions on types of materials to be stocked and ratios of quantities of various categories of fiction and nonfiction. A wealth of research exists in the world of profit organizations; librarians could gain by use of these findings.

One example of such an approach is reported in Operations Research (Anderson, 1974), addressing the problem of optimal choice of brands and brand display in a supermarket, analogous to choice of types of materials and catalog display of library materials in a mail order delivery operation. A model is developed in the cited research; with adjustment to eliminate effect of the profit motive (the model advocates extra space for those brands with higher profit), such a model could be adapted to assist on-going selection of materials for the collection as well as space allocated in the printed catalog for various types of materials.

Librarians have been loath to merchandise aggressively, apparently feeling that the genteel modest posture is sufficient for selling a product which is so incontrovertibly a basic good. The techniques of the commercial world can be adapted to library use; see Frederick Glazer's "Selling the Library" (Glazer, 1974). And there is no more obvious or natural place to apply these techniques than in the mail order delivery operation, where we do not meet the "customer" face to face but must rely on our powers of advertising and forecasting to build demand and to provide adequate quantities of the materials which will be most heavily demanded.

The user's viewpoint should be analyzed, as in any selling effort. In the present study, this omission has been due to lack of manpower rather than lack of desire; a telephone survey was considered early in the design of the study (though house-to-house interviews would have been preferred for validity of findings) but abandoned because of the magnitude of the effort required. It is hoped that such an evaluation will be made at some future date; the findings can be very valuable in future decisions as to MOD operations, even after the larger organizational decisions based on this study have gone into implementation. Such a user survey could contribute toward improvement of communications via the catalogs and toward more patron-oriented book selection.

The computer model of mail order delivery operations provided printouts too voluminous to be reproduced in entirety in this report; for readers who wish further information, copies of additional computer output are available from the investigators.

The model has further potential utility, as plans for statewide MOD service become more concrete. Thus, if one of the present centers is to be expanded to serve other areas of the state, the model can simulate that expansion to aid management decisions prior to operation. Or if additional information becomes available regarding demographic, postal, or other data, the model can be adapted to the new knowledge and adjusted results provided. Furthermore, subsequent to the establishment of a MOD service, the model can be employed as a tool in on-going evaluation of the operations. There is also the possibility of adapting or rewriting the model to a change of operational systems so that a different approach to MOD service can be reflected and the effects be predicted.

The analytic tools of this study, including computer simulation, should be applied in periodic evaluation of any MOD operation which is established.

RECOMMENDATIONS

- One MOD center to serve the state will effect cost savings over multi-centers and provide good postal delivery time; political factors such as the local library's role may necessitate some modification of this pattern.

- Vendor services should be investigated in the areas of book selection, processing, annotation, and catalog production and mailing. Catalogs can be localized by inserts or by varying the cover content for each separate service area; the all-state catalog can be accomplished either by a vendor or by low bidding printer, regardless of the number of operating MOD centers established.

- If more than one MOD center is established, and no vendor is used, all possible operations should be centralized, including selection, ordering, processing of books, annotation, and production and mailing of catalogs.

- Prior to start-up of an MOD operation, considerable discussion should take place with personnel at the post office which will be handling the mail, to insure cooperation and coordination on the part of both the MOD center and the post office.

- In advance of establishment of an MOD service, the potential patrons should receive explanatory promotional material, so that they are alerted to the receipt of non-junk mail via the "Boxholder" mode of address.

- The MOD catalog should clearly state the pattern of catalog issuance, so that patrons will understand the length of time during which the titles in each catalog will be available, and when new listings can be expected to arrive.

- Catalogs should be mailed at a steady rate in small quantities so as to smooth out the response load for the staff.

- Four catalogs per year, containing about 500 titles each, seems about the rate and quantity of material to satisfy most users. Flyers listing newer titles should be inserted in each outgoing package.

- The MOD catalog should strongly emphasize the availability of materials not listed in the catalog, so that patrons whose reading tastes go beyond the regular MOD collection are encouraged to request other items.

- Titles not listed in current catalogs should not be held even though they might be requested by a few users per year; these should be transferred to a regular library or libraries, and sent from there as interlibrary loans if requested. From a cost viewpoint, every title in the MOD collection must be in some demand in order to justify its shelf space.

- The possibility of working out a "McNaughton Plan" arrangement with a vendor should be investigated, to obtain some credit on discarded books.

- Duplication of each title should be held to the minimum necessary to respond to requests without undue delay.

- The heavy emphasis on "popular" recreational reading by present MOD centers should be questioned; regular libraries of Washington State report that about half the circulation is in non-fiction titles, and it can be assumed that MOD users will follow the same pattern.

- Manual files in any MOD operation should be kept to a minimum. Reserve procedures and overdue routines are two ares where simplification should be emphasized. Permissive borrower rules can ease the overdue and fines problem.

- Staffing pattern should permit same-day response to all requests for on-shelf items.

- Utilization of professional librarians should be minimized; the work of the MOD center can be accomplished largely or entirely by non-professionals.

- Once MOD service is established in an area, follow-up efforts should promote the full gamut of services available from local libraries -- or, in unserved areas, promote the development of local library service.

- Further investigations are needed in such areas as analysis of user needs, vendor services, alternatives in catalog production, collection analysis, optimum number of duplicate copies per title, evaluation of marketing techniques.

- Provisions should be made for on-going evaluation of the MOD operations, utilizing and adapting the model constructed for this study as well as more conventional techniques.

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EXHIBITS

Exhibit 1

CIRCULATION AND COST COMPARISONS

Library	Monthly Circulation	Cost per Circulation
Wyoming County Library System, New York (1972 figures)	1,761	.73
North Central Regional Library, Washington (1972 figures)	8,132	.61
Dodge County Library, Wisconsin (1972 figures)	229	.60[1]
Vermont State Library (July 1972 - March 1973)	3,233	.68
Bur Oak Library System, Illinios (June 1971 - December 1972)	1,990	.65
Corn Belt Library System, Illinios (April - December 1972)	930	.87
Rolling Prairie Library System, Illinios (February - December 1972)	1,275	.63

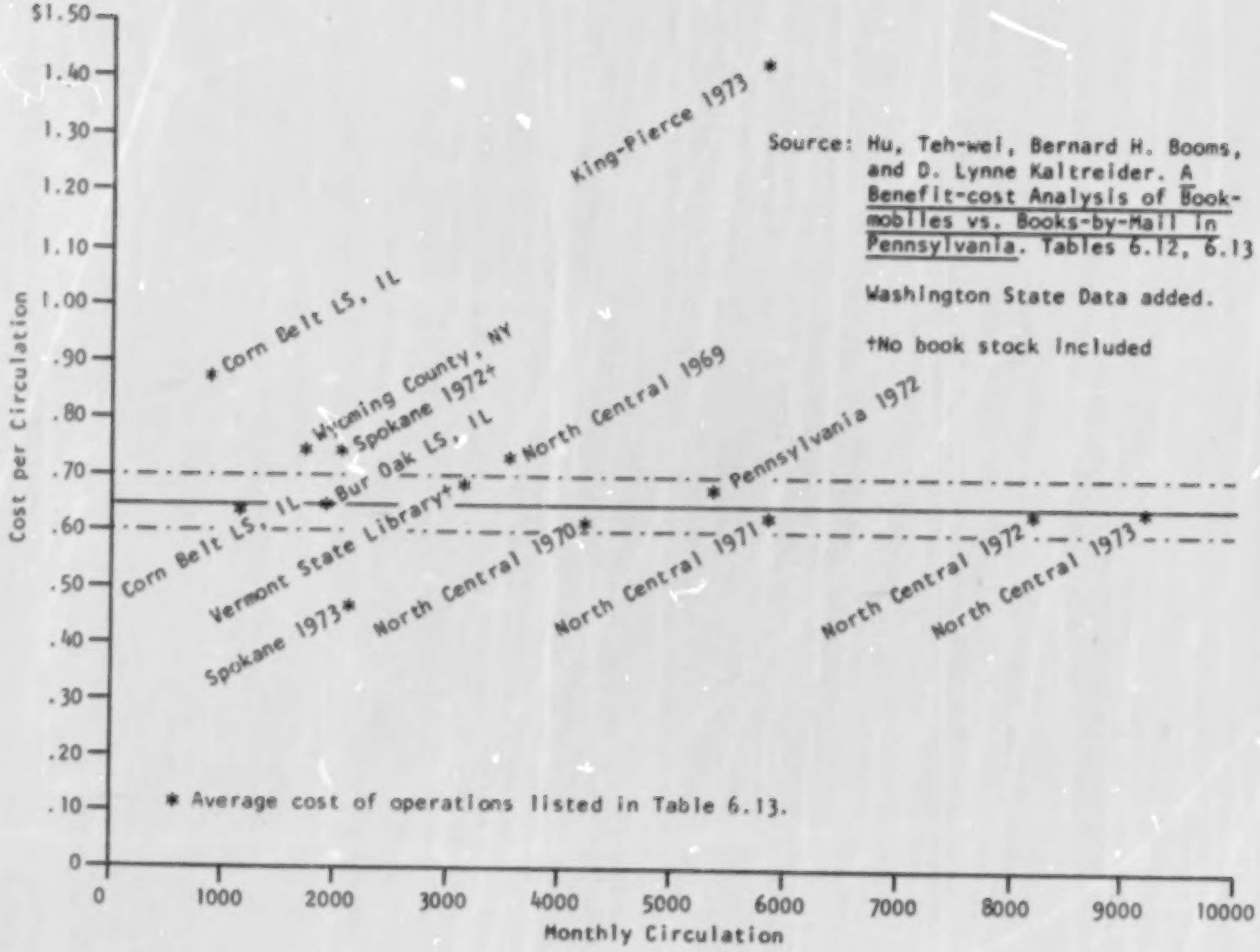
Source:

Hu, Teh-wei, Bernard H. Booms, and D. Lynne Kaltreider. A Benefit-cost Analysis of Bookmobiles vs. Books-by-Mail in Pennsylvania. Tables 6.12.

[1] No special collection or staff

Exhibit 2

MEAN COST PER CIRCULATION



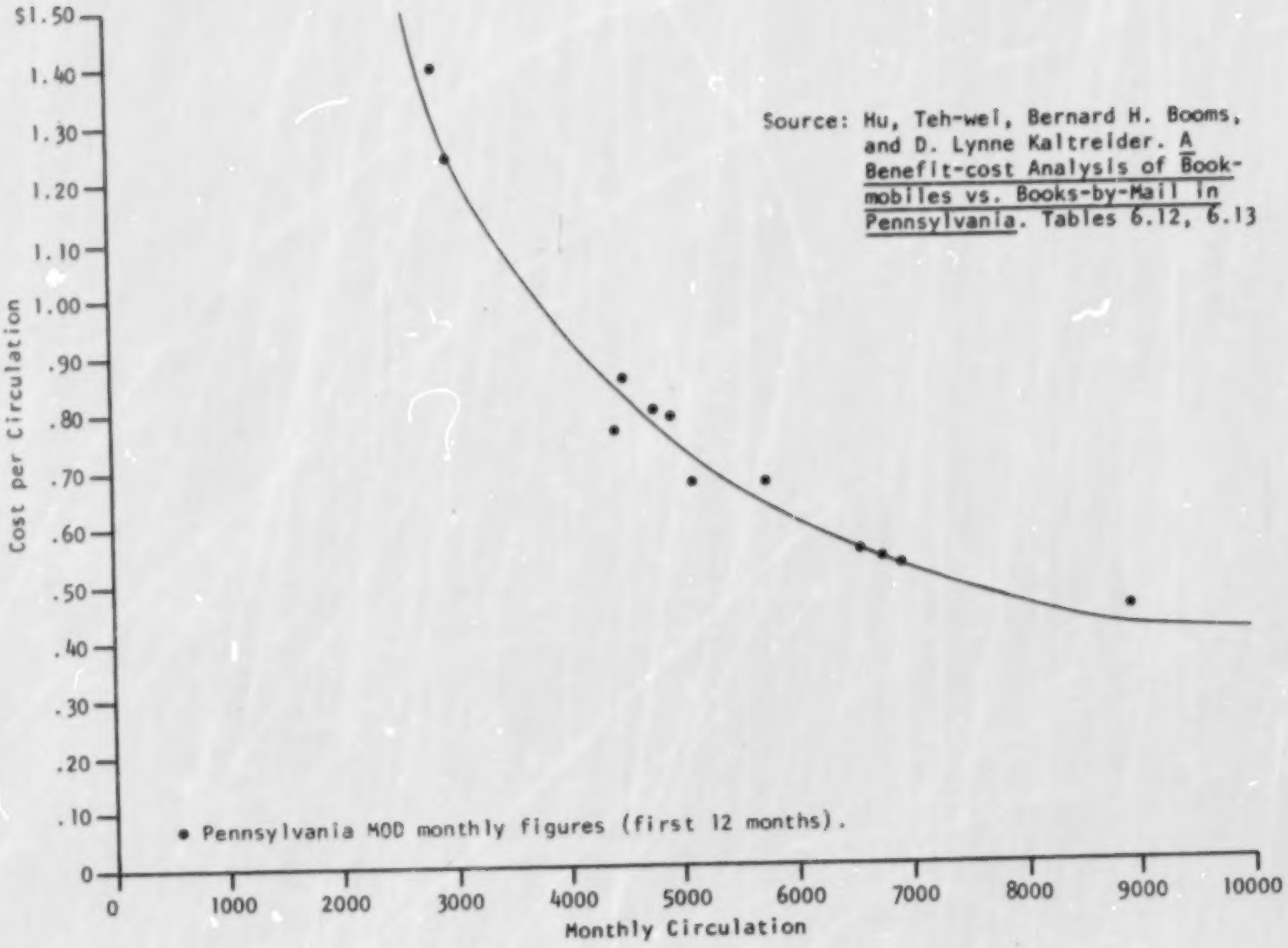
Source: Hu, Teh-wei, Bernard H. Booms, and D. Lynne Kaltreider. A Benefit-cost Analysis of Bookmobiles vs. Books-by-Mail in Pennsylvania. Tables 6.12, 6.13

Washington State Data added.

†No book stock included

Exhibit 3

PROJECTED RELATIONSHIP BETWEEN COST AND CIRCULATION



Source: Hu, Teh-wei, Bernard H. Booms, and D. Lynne Kaltreider. A Benefit-cost Analysis of Bookmobiles vs. Books-by-Mail in Pennsylvania. Tables 6.12, 6.13

Exhibit 4

WASHINGTON STATE
PUBLIC LIBRARY CIRCULATION OF FICTION Vs NON-FICTION IN 1972*

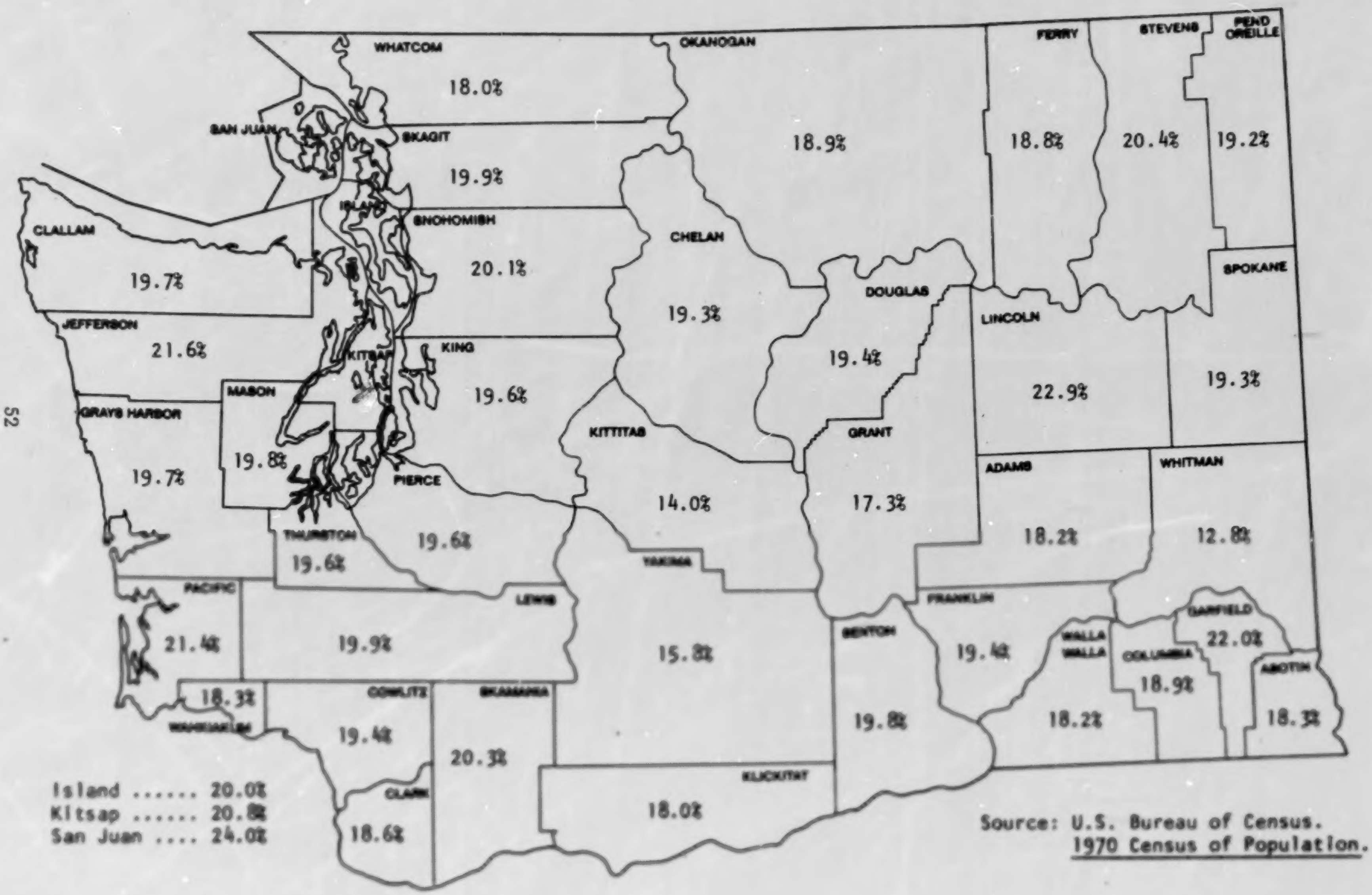
LIBRARIES SERVING:	RURAL COUNTIES		URBAN COUNTIES	
	Fiction	Non-fiction	Fiction	Non-fiction
Over 100,000 population (5 libraries)	52.9%	47.1%	47.2%	52.8%
25,001 to 100,000 population (3 libraries)	48.5%	51.5%	54.8%	45.2%
5,001 to 25,000 population (17 libraries)	56.8%	43.2%	57.2%	42.8%
Under 5,000 population (31 libraries)	68.5%	31.5%**	48.3%	51.7%
GRAND TOTALS	55.9%	44.1%	48.4%	51.6%

* Many libraries do not maintain separate circulation records for fiction and non-fiction. These statistics represent 56 of the 81 public libraries reporting to the State Library. (Missing are 7 of 12 in over 100,000 category; 4 of 7 in 25,001 to 100,000 category; 1 of 18 in 5,001 to 25,000 category; and 13 of 44 in under 5,000 category.)

** Although not investigated, it can be assumed that in many instances, higher circulation of fiction in the rural counties reflects an inability to purchase a wide variety of titles to keep a non-fiction collection current.

Exhibit 5

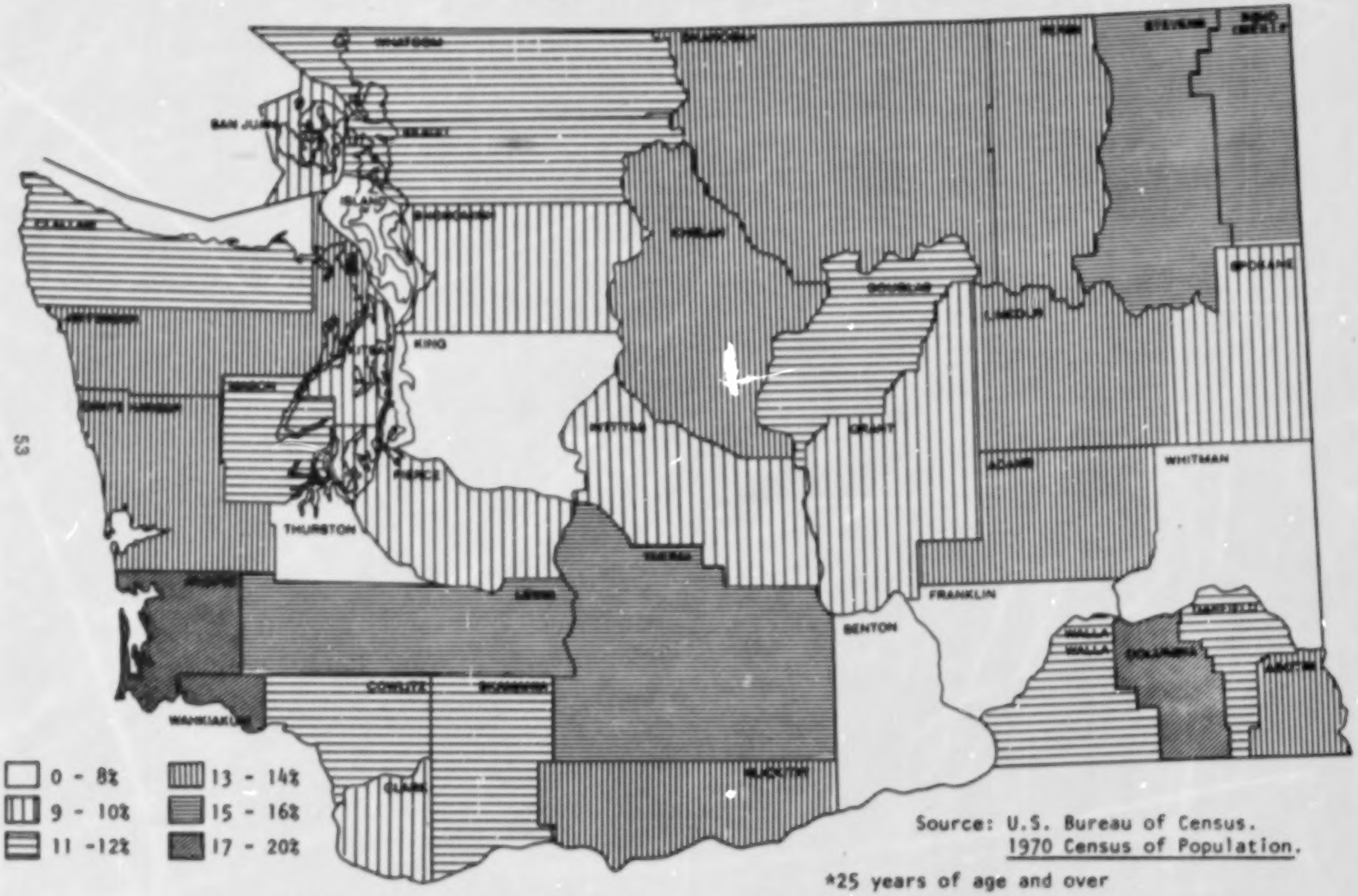
PERCENT OF COUNTY POPULATION (25 YEARS OF AGE OR OLDER) COMPLETING FOUR YEARS OF HIGH SCHOOL


WHATCOM
18.0%
OKANOGAN
18.9%
FERRY
18.8%
STEVENS
20.4%
PEND OREILLE
19.2%
SAN JUAN
SKAGIT
19.9%
CLALLAM
19.7%
ISLAND
SNOHOMISH
20.1%
CHELAN
19.3%
DOUGLAS
19.4%
LINCOLN
22.9%
SPOKANE
19.3%
JEFFERSON
21.6%
KITSAP
KING
19.6%
MASON
19.8%
GRAYS HARBOR
19.7%
KITTITAS
14.0%
GRANT
17.3%
ADAMS
18.2%
WHITMAN
12.8%
PIERCE
19.6%
THURSTON
19.6%
YAKIMA
15.8%
PACIFIC
21.4%
LEWIS
19.9%
BENTON
19.8%
FRANKLIN
19.4%
WALLA WALLA
18.2%
COLUMBIA
18.9%
GARFIELD
22.0%
ASOTIN
18.3%
WAHKIAKUM
18.3%
COWLITZ
19.4%
SKAMANIA
20.3%
CLARK
18.6%
KLICKITAT
18.0%
Island 20.0%
Kitsap 20.8%
San Juan 24.0%

Source: U.S. Bureau of Census. 1970 Census of Population.

Exhibit 6

PERCENT OF COUNTY POPULATION COMPLETING ONLY EIGHT OR FEWER GRADES*

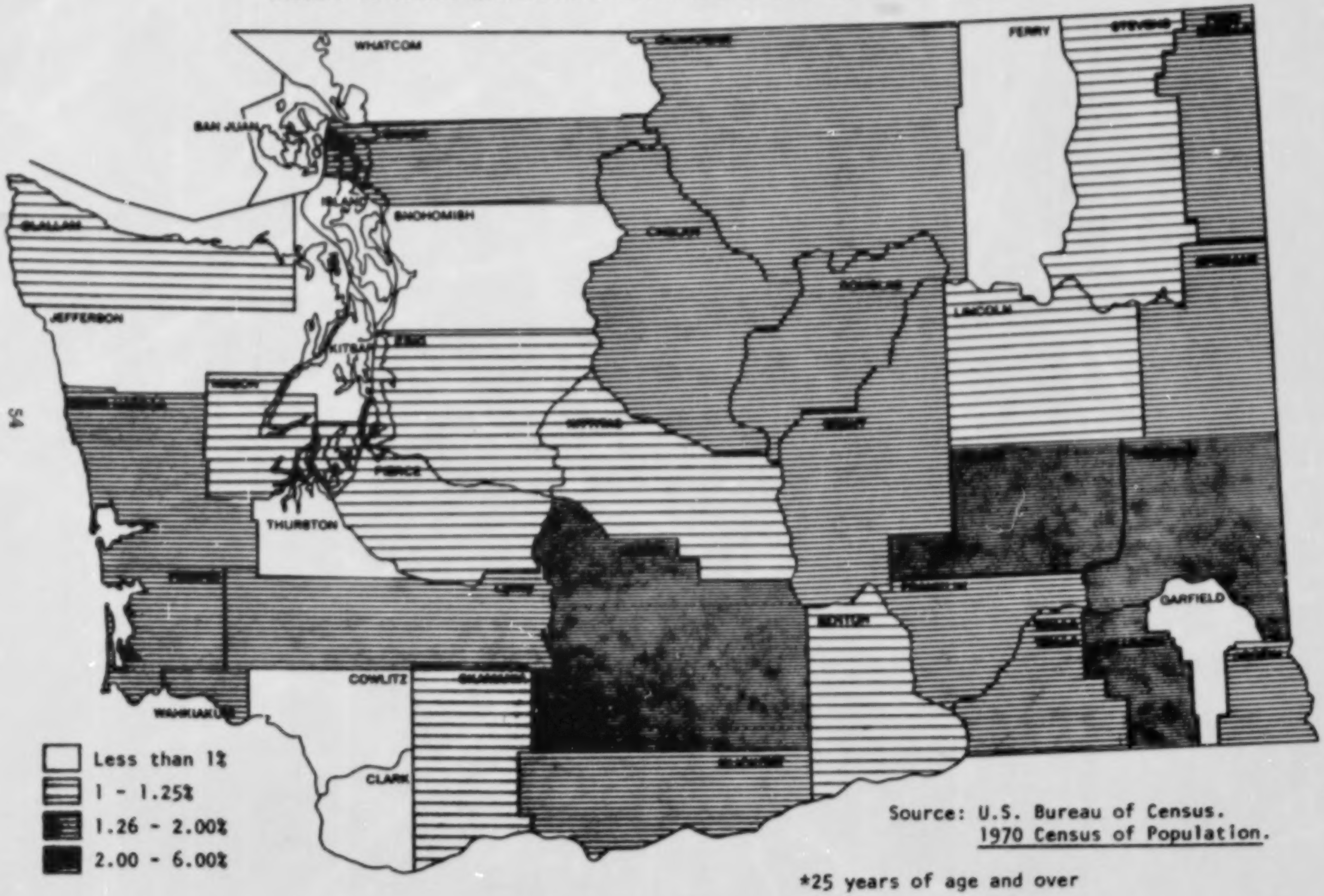

WHATCOM
OKANOGAN
FERRY
STEVENS
PEND OREILLE
SAN JUAN
SKAGIT
ISLAND
SNOHOMISH
CLALLAM
CHELAN
DOUGLAS
SPOKANE
JEFFERSON
LINCOLN
KING
MASON
GRAYS HARBOR
KITTITAS
GRANT
PIERCE
WHITMAN
ADAMS
THURSTON
YAKIMA
PACIFIC
LEWIS
FRANKLIN
BENTON
WALLA WALLA
COLUMBIA
GARFIELD
ASOTIN
WAHKIAKUM
COWLITZ
SKAMANIA
CLARK
KLICKITAT
0 - 8%
9 - 10%
11 -12%
13 - 14%
15 - 16%
17 - 20%

Source: U.S. Bureau of Census.
1970 Census of Population.

*25 years of age and over

Exhibit 6a

PERCENT OF COUNTY POPULATION COMPLETING ONLY FOUR OR FEWER GRADES*


WHATCOM
SAN JUAN
ISLAND
SNOHOMISH
CLALLAM
JEFFERSON
KITSAP
PIERCE
THURSTON
COWLITZ
CLARK
WAHKIAKUM
FERRY
STEVENS
CHELAN
DOUGLAS
LINCOLN
KITTITAS
BENTON
GARFIELD
□ Less than 1%
▤ 1 - 1.25%
▦ 1.26 - 2.00%
■ 2.00 - 6.00%

Source: U.S. Bureau of Census.
1970 Census of Population.

*25 years of age and over

Exhibit 7

ALLOCATIONS FOR OPERATING EXPENDITURES, 1973

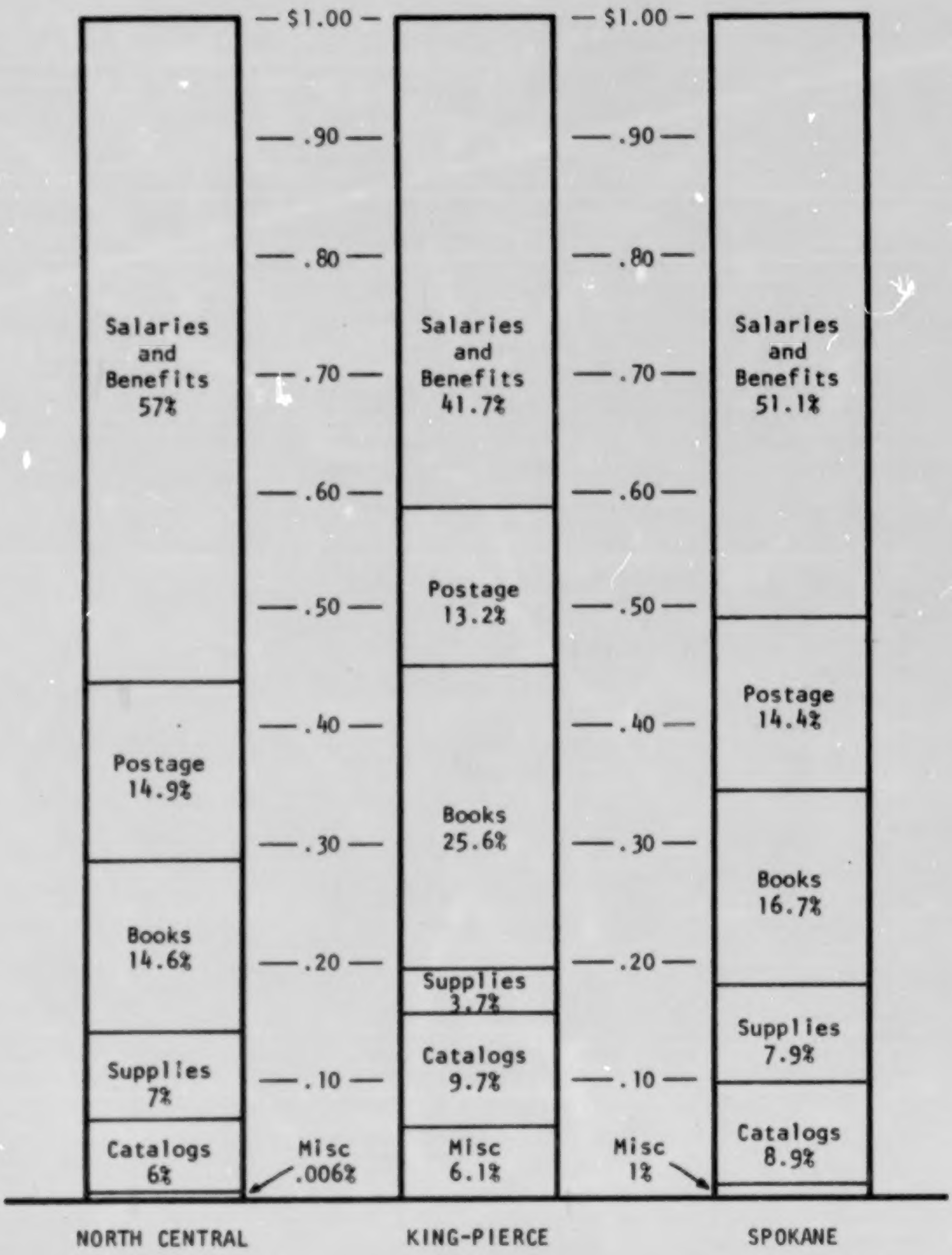
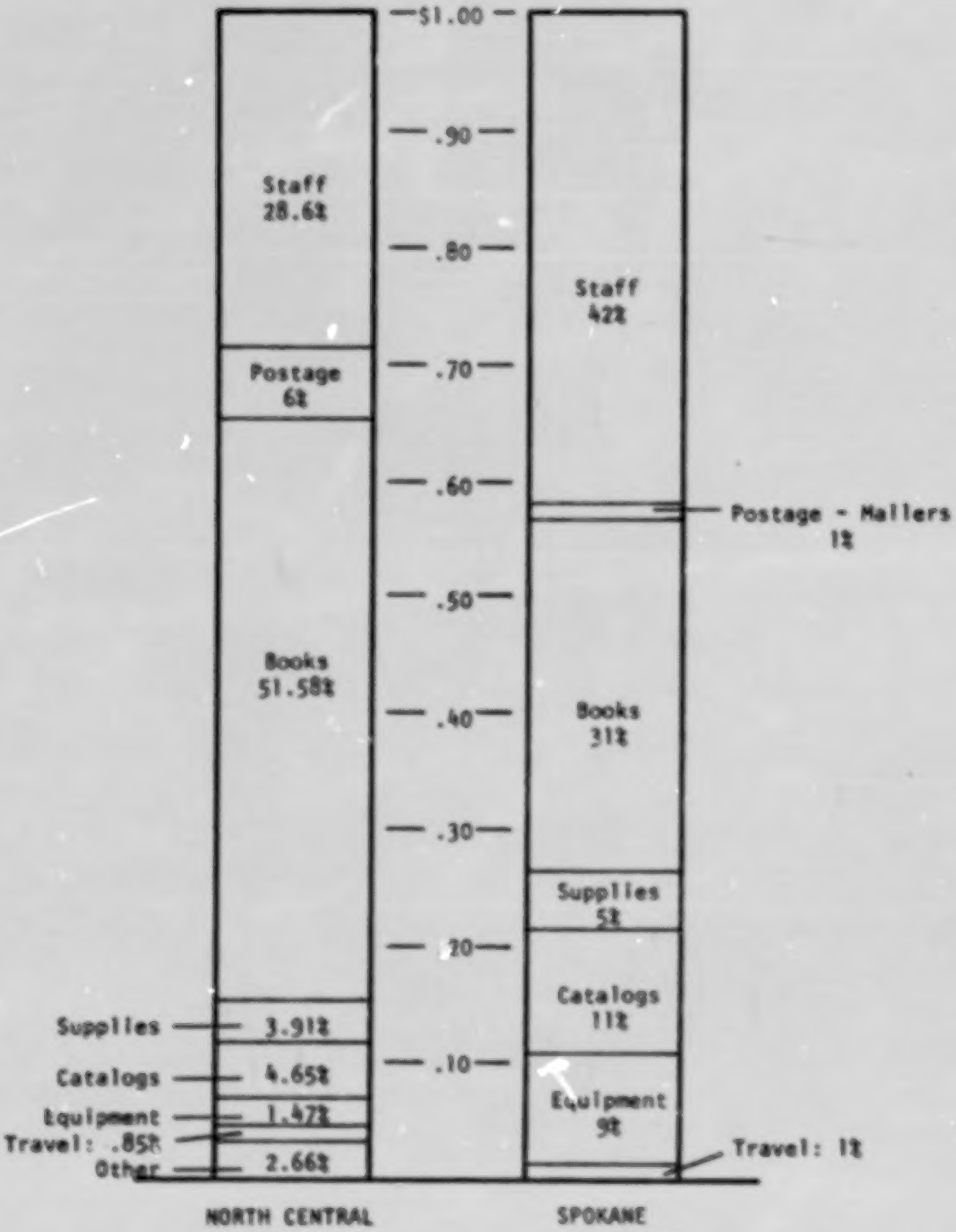


Exhibit 7a

ALLOCATIONS FOR START-UP EXPENDITURES*



*Remodeling costs not included.
King-Pierce expenditures not included because of incompatible figures.

Exhibit 8

WASHINGTON STATE MAIL ORDER CENTERS - MONTHLY CIRCULATION

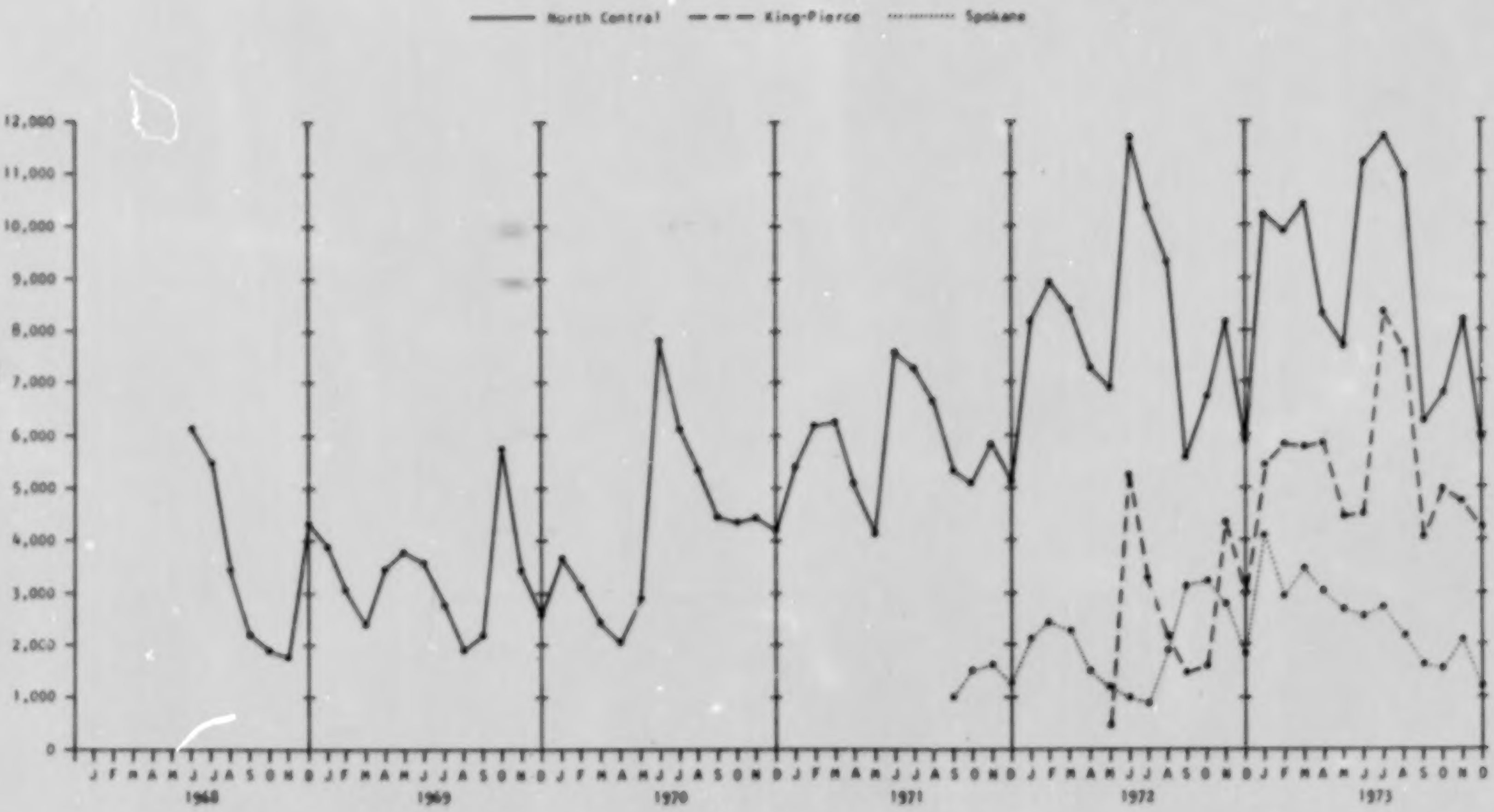
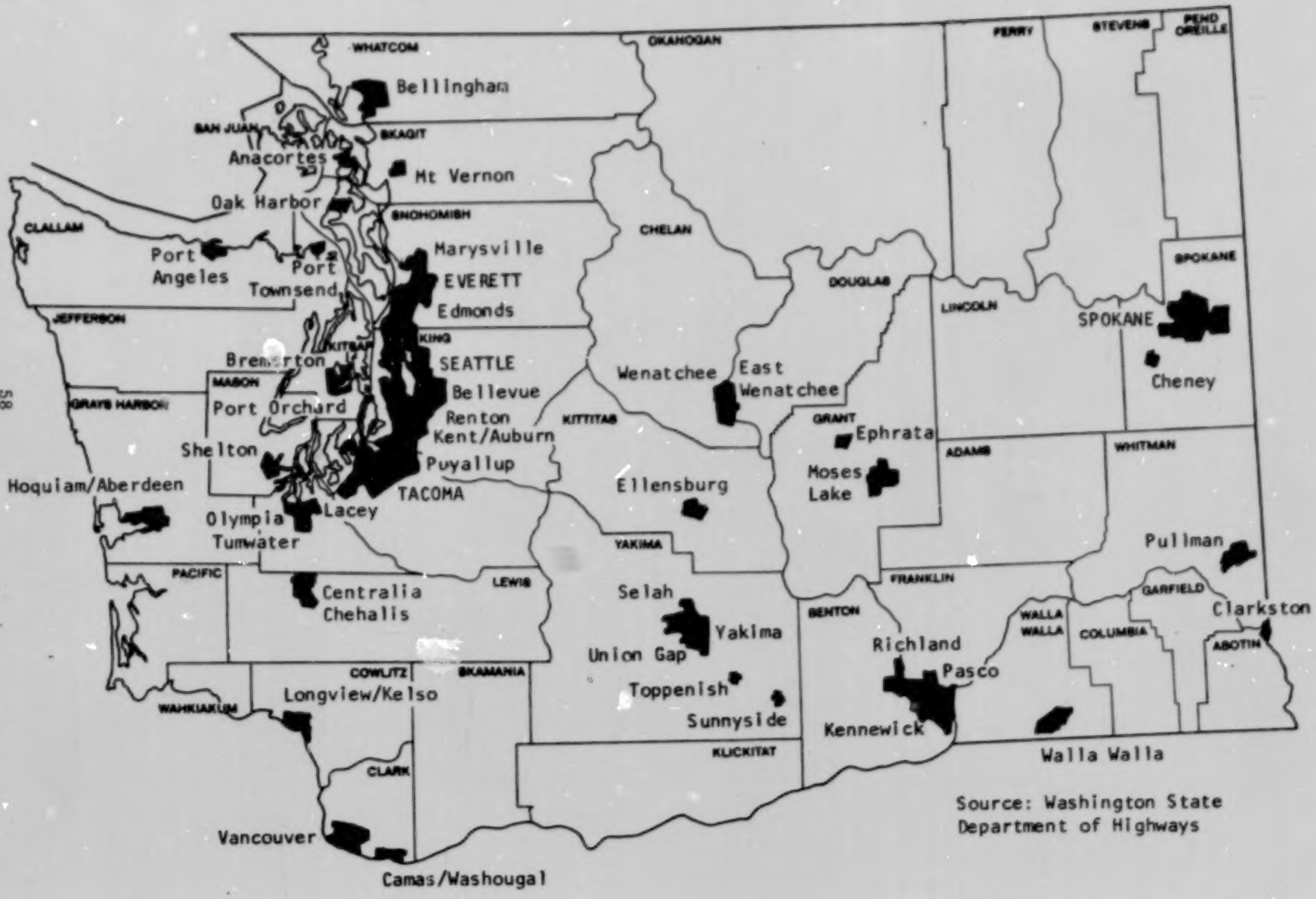


Exhibit 9

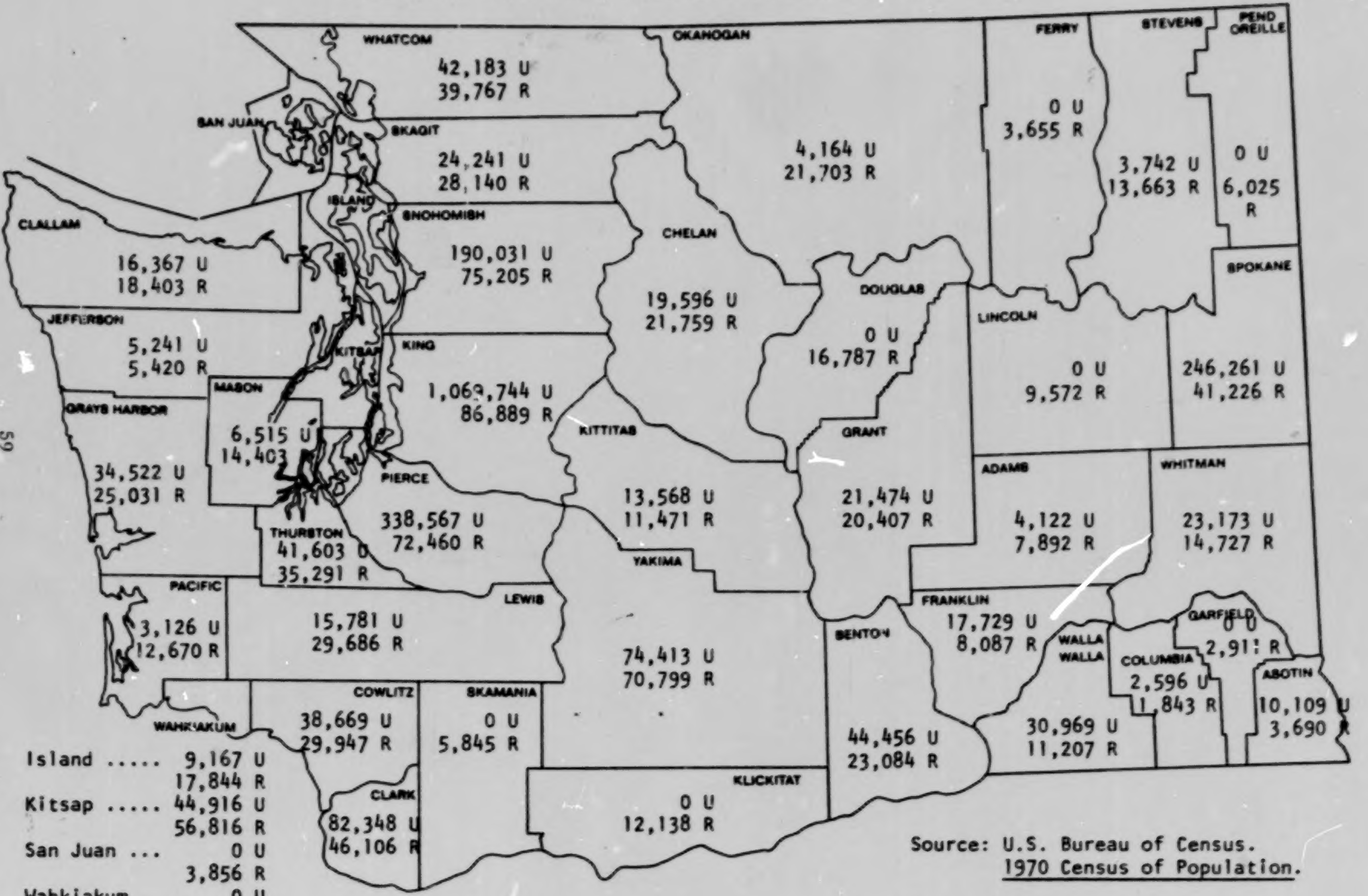
URBAN AREAS, WASHINGTON STATE


WHATCOM
OKANOGAN
FERRY
STEVENS
PEND OREILLE
Bellingham
SAN JUAN
SKAGIT
Anacortes
Mt Vernon
Oak Harbor
SNOHOMISH
CLALLAM
CHELAN
Port Angeles
Port Townsend
Marysville
EVERETT
Edmonds
DOUGLAS
LINCOLN
SPOKANE
SPOKANE
JEFFERSON
KING
KITSAP
Bremerton
SEATTLE
Wenatchee
East Wenatchee
Cheney
MASON
GRAYS HARBOR
Port Orchard
Bellevue
Renton
Kent/Auburn
KITTITAS
GRANT
Ephrata
ADAMS
WHITMAN
Shelton
Puyallup
Moses Lake
Hoquiam/Aberdeen
TACOMA
Ellensburg
Lacey
Olympia
Tumwater
YAKIMA
Pullman
PACIFIC
LEWIS
FRANKLIN
GARFIELD
Centralia
Chehalis
Selah
BENTON
Clarkston
Yakima
WALLA WALLA
COLUMBIA
Richland
ASOTIN
Union Gap
Pasco
COWLITZ
SKAMANIA
Longview/Kelso
Toppenish
WAHKIAKUM
Sunnyside
Kennewick
KLICKITAT
Walla Walla
CLARK
Vancouver
Camas/Washougal

Source: Washington State
Department of Highways

Exhibit 10

URBAN/RURAL POPULATION, COUNTIES OF WASHINGTON STATE

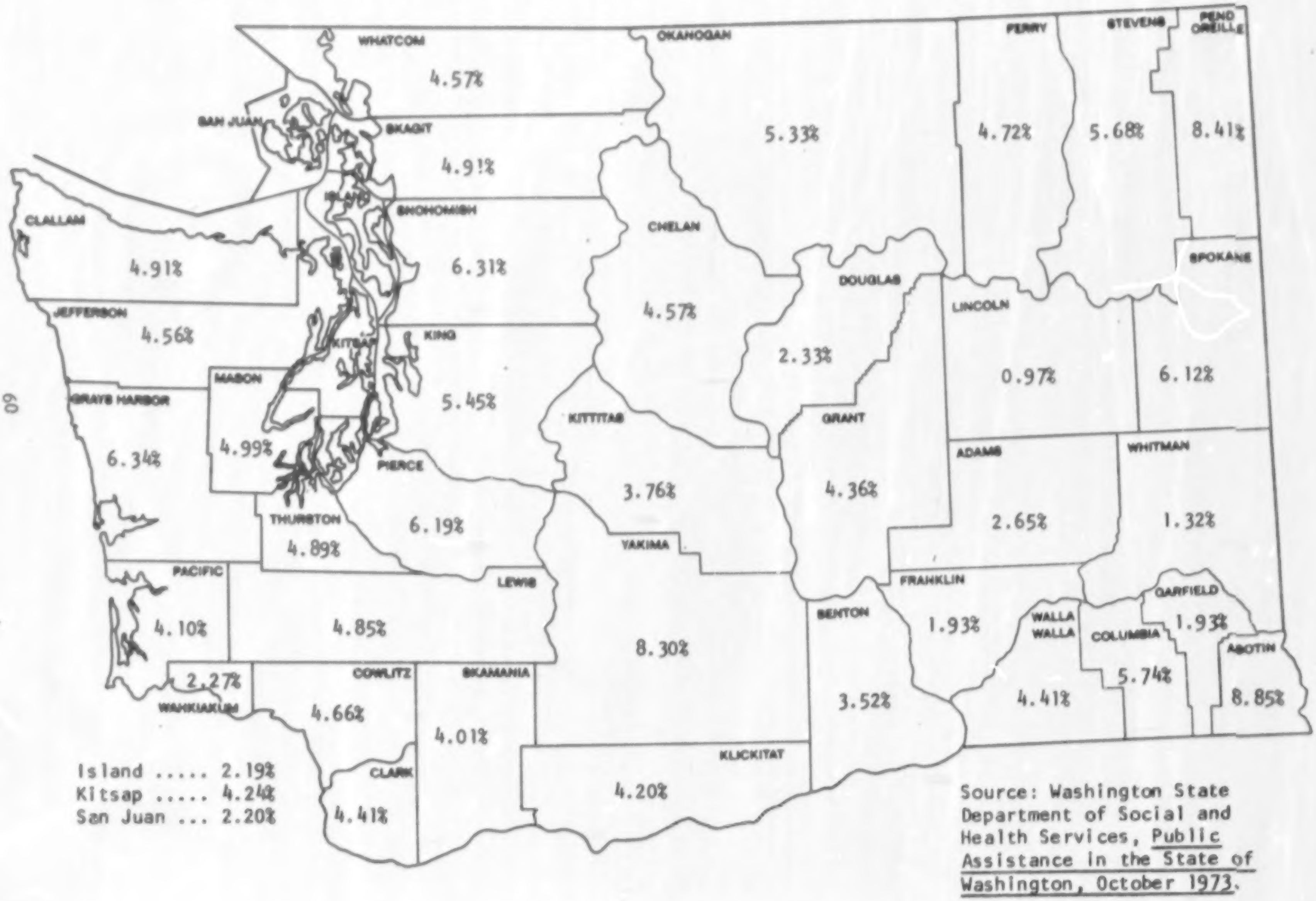

WHATCOM
42,183 U
39,767 R
SAN JUAN
SKAGIT
24,241 U
28,140 R
ISLAND
SNOHOMISH
190,031 U
75,205 R
CLALLAM
16,367 U
18,403 R
JEFFERSON
5,241 U
5,420 R
KITSAP
KING
1,069,744 U
86,889 R
MASON
6,515 U
14,403
GRAYS HARBOR
34,522 U
25,031 R
PIERCE
338,567 U
72,460 R
THURSTON
41,603 U
35,291 R
PACIFIC
3,126 U
12,670 R
LEWIS
15,781 U
29,686 R
WAHKIAKUM
COWLITZ
38,669 U
29,947 R
SKAMANIA
0 U
5,845 R
CLARK
82,348 U
46,106 R
OKANOGAN
4,164 U
21,703 R
CHELAN
19,596 U
21,759 R
KITTITAS
13,568 U
11,471 R
YAKIMA
74,413 U
70,799 R
KLICKITAT
0 U
12,138 R
DOUGLAS
0 U
16,787 R
GRANT
21,474 U
20,407 R
BENTON
44,456 U
23,084 R
FERRY
0 U
3,655 R
STEVENS
3,742 U
13,663 R
PEND OREILLE
0 U
6,025 R
LINCOLN
0 U
9,572 R
SPOKANE
246,261 U
41,226 R
ADAMS
4,122 U
7,892 R
WHITMAN
23,173 U
14,727 R
FRANKLIN
17,729 U
8,087 R
WALLA WALLA
30,969 U
11,207 R
COLUMBIA
2,596 U
1,843 R
GARFIELD
0 U
2,911 R
ASOTIN
10,109 U
3,690 R

Island	9,167 U 17,844 R
Kitsap	44,916 U 56,816 R
San Juan ...	0 U 3,856 R
Wahkiakum ..	0 U 3,592 R

Source: U.S. Bureau of Census.
1970 Census of Population.

Exhibit 11

PERCENT OF POPULATION RECEIVING PUBLIC ASSISTANCE, 1973
(Old Age Assistance; Disability Assistance or Aid to Families with Dependent Children)


WHATCOM
4.57%
OKANOGAN
5.33%
FERRY
4.72%
STEVENS
5.68%
PEND OREILLE
8.41%
SAN JUAN
SKAGIT
4.91%
ISLAND
SNOHOMISH
6.31%
CLALLAM
4.91%
CHELAN
4.57%
DOUGLAS
2.33%
SPOKANE
6.12%
LINCOLN
0.97%
JEFFERSON
4.56%
KITSAP
KING
5.45%
MASON
4.99%
GRAYS HARBOR
6.34%
KITTITAS
3.76%
GRANT
4.36%
ADAMS
2.65%
WHITMAN
1.32%
PIERCE
6.19%
THURSTON
4.89%
YAKIMA
8.30%
LEWIS
4.85%
PACIFIC
4.10%
WAHKIAKUM
2.27%
COWLITZ
4.66%
SKAMANIA
4.01%
CLARK
4.41%
KLICKITAT
4.20%
BENTON
3.52%
FRANKLIN
1.93%
WALLA WALLA
4.41%
COLUMBIA
5.74%
GARFIELD
1.93%
ASOTIN
8.85%
Island 2.19%
Kitsap 4.24%
San Juan ... 2.20%

Source: Washington State Department of Social and Health Services, Public Assistance in the State of Washington, October 1973.

Exhibit 12

LIBRARY SERVICES TO WASHINGTON STATE, 1972
(Total Population 3,417,500)

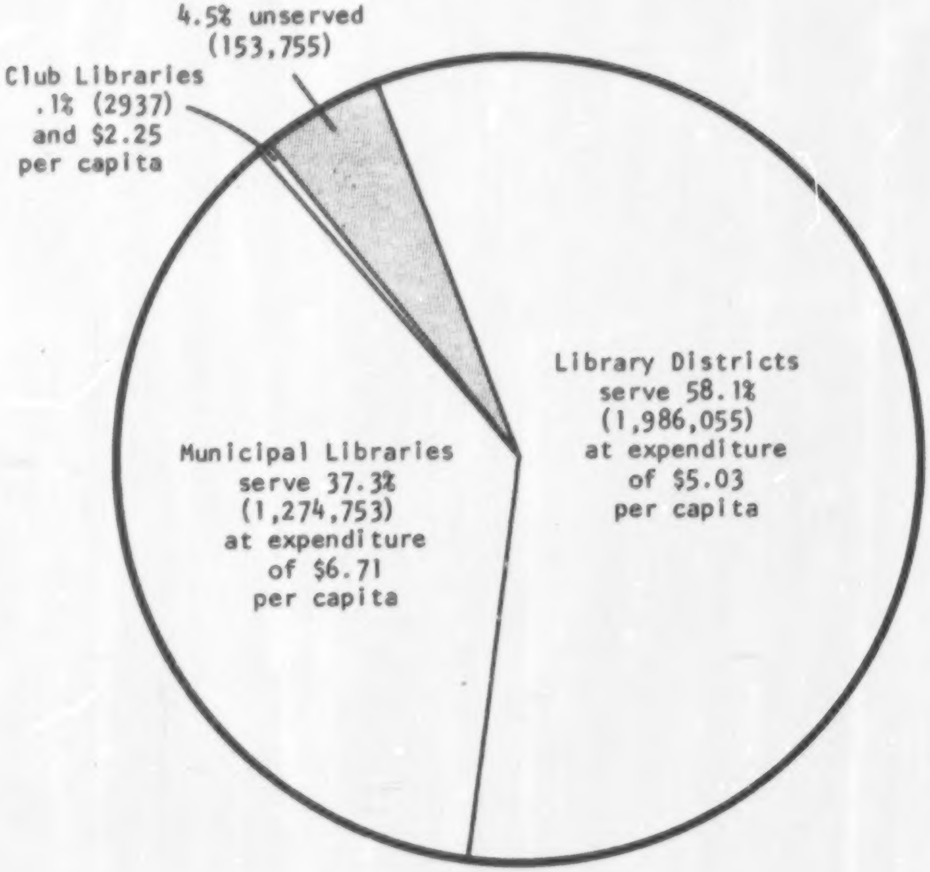


Exhibit 13

PUBLIC LIBRARY SERVICE PATTERN IN WASHINGTON

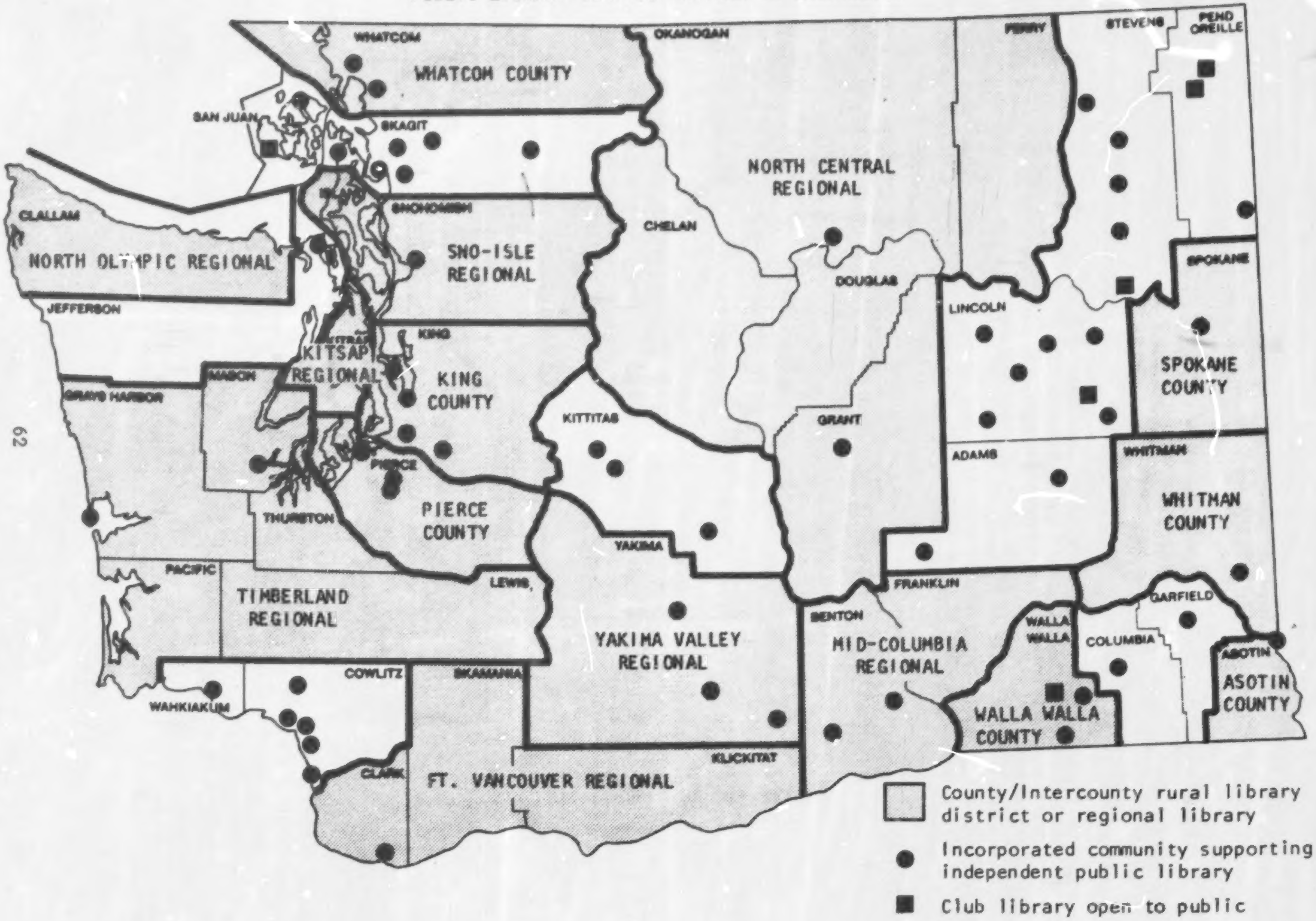
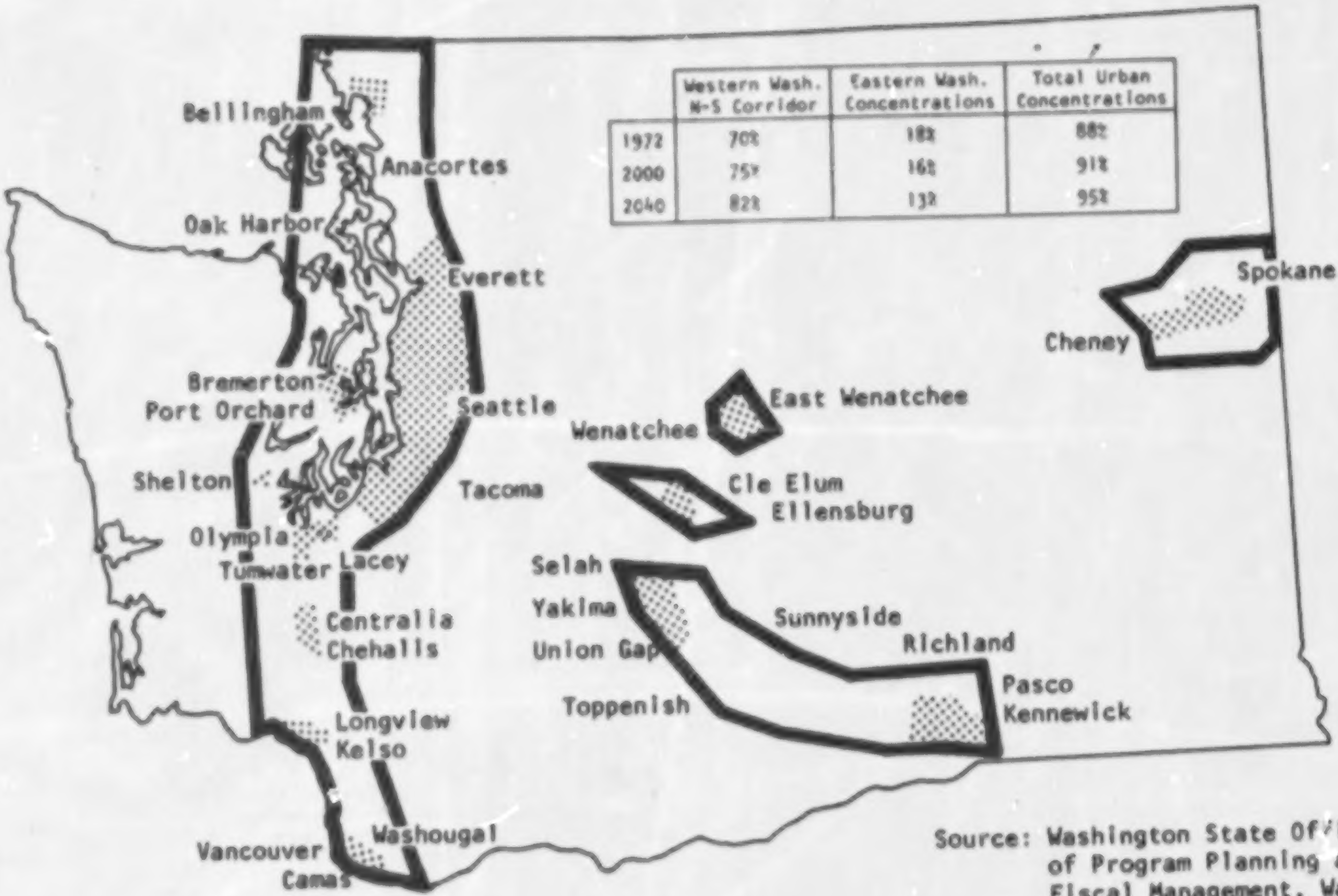

WHATCOM
WHATCOM COUNTY
OKANOGAN
PERRY
STEVENS
PEND OREILLE
SAN JUAN
SKAGIT
NORTH CENTRAL REGIONAL
CLALLAM
SNOHOMISH
SNO-ISLE REGIONAL
CHELAN
NORTH OLYMPIC REGIONAL
DOUGLAS
SPOKANE
JEFFERSON
LINCOLN
KING
KITSAP REGIONAL
KING COUNTY
SPOKANE COUNTY
MASON
GRAYS HARBOR
KITTITAS
GRANT
ADAMS
WHITMAN
PIERCE
PIERCE COUNTY
THURSTON
WHITMAN COUNTY
YAKIMA
PACIFIC
LEWIS
TIMBERLAND REGIONAL
FRANKLIN
GARFIELD
BENTON
WALLA WALLA
COLUMBIA
YAKIMA VALLEY REGIONAL
MID-COLUMBIA REGIONAL
ASOTIN
COWLITZ
SKAMANIA
WAHKIAKUM
WALLA WALLA COUNTY
ASOTIN COUNTY
KLICKITAT
CLARK
FT. VANCOUVER REGIONAL
▨ County/Intercounty rural library district or regional library
● Incorporated community supporting independent public library
■ Club library open to public

Exhibit 14

GEOGRAPHIC POPULATION DISTRIBUTION


Bellingham
Anacortes
Oak Harbor
Everett
Bremerton
Port Orchard
Seattle
Shelton
Tacoma
Olympia
Tumwater
Lacey
Centralia
Chehalis
Longview
Kelso
Vancouver
Camas
Washougal
Wenatchee
East Wenatchee
Cle Elum
Ellensburg
Selah
Yakima
Union Gap
Toppenish
Sunnyside
Richland
Pasco
Kennewick
Cheney
Spokane

	Western Wash. N-S Corridor	Eastern Wash. Concentrations	Total Urban Concentrations
1972	70%	18%	88%
2000	75%	16%	91%
2040	82%	13%	95%

Source: Washington State Office of Program Planning and Fiscal Management, Washington State Population Studies, June 1973.

Exhibit 15

WASHINGTON STATE POSTAL ZIP CODES AND SECTIONAL CENTERS

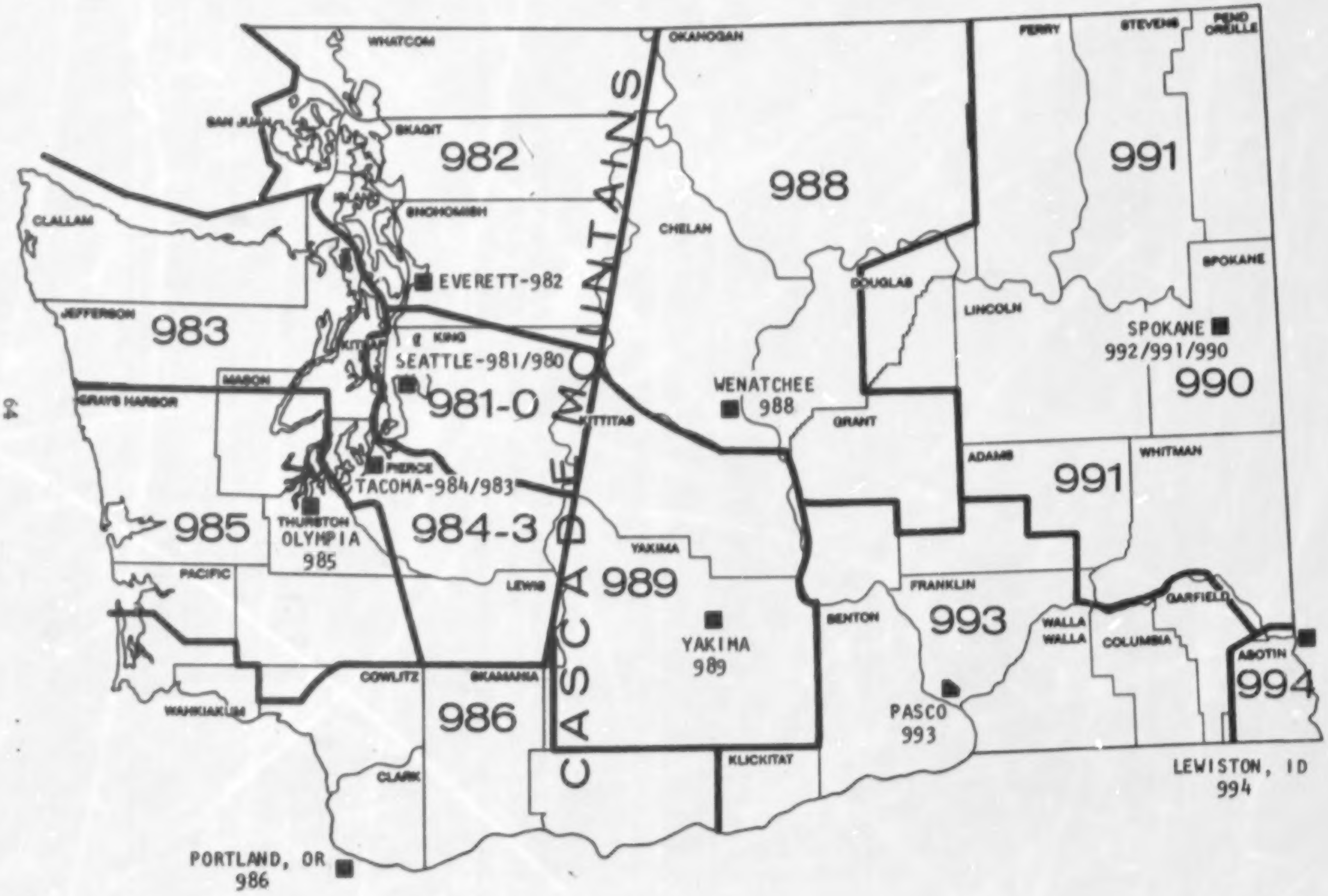
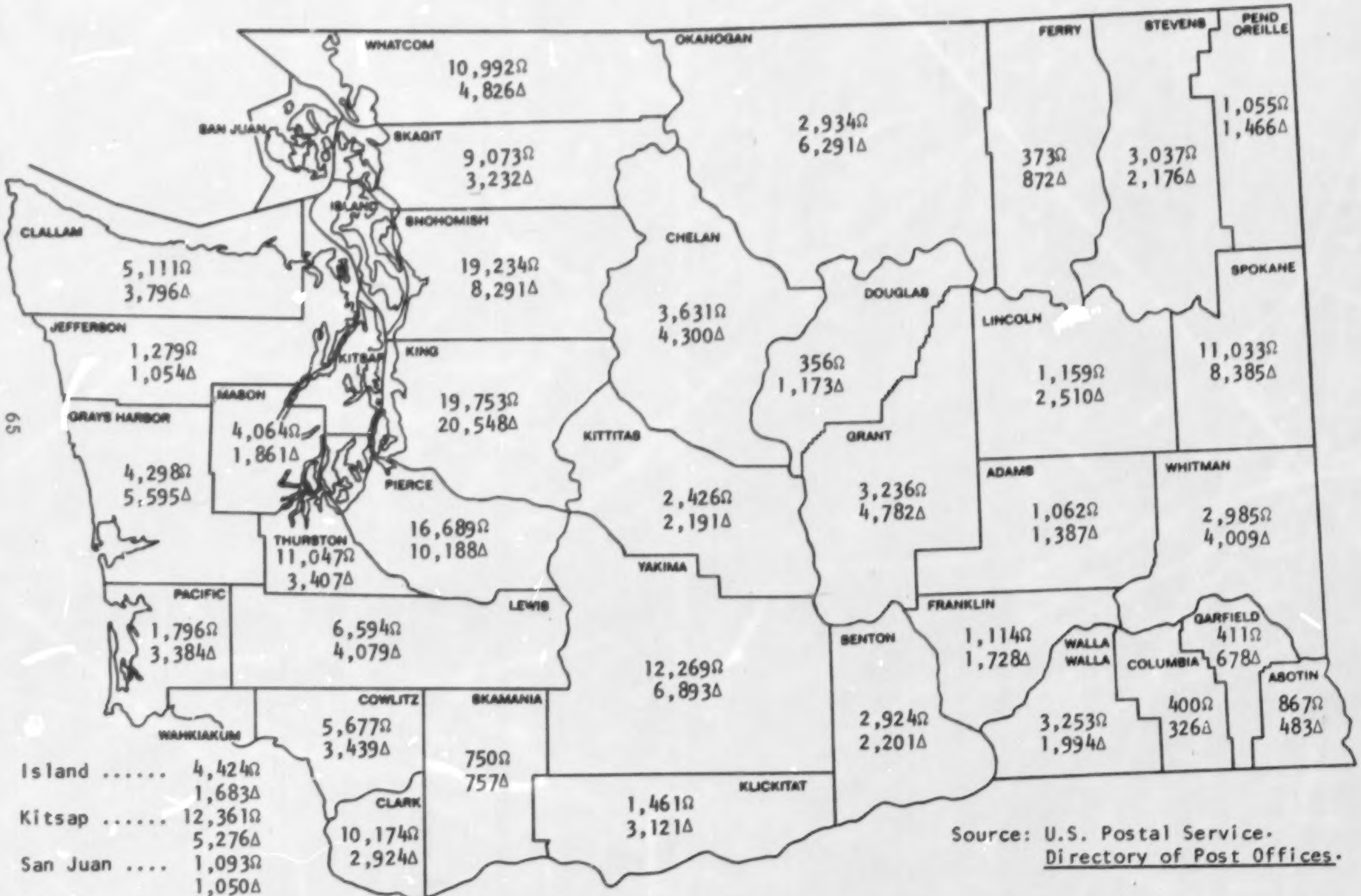

WHATCOM
SAN JUAN
SKAGIT
982
ISLAND
SNOHOMISH
CLALLAM
EVERETT-982
JEFFERSON
983
KITSAP
KING
SEATTLE-981/980
981-0
MASON
GRAYS HARBOR
PIERCE
TACOMA-984/983
985
THURSTON
OLYMPIA
985
984-3
PACIFIC
LEWIS
WAHKIAKUM
COWLITZ
SKAMANIA
986
CLARK
PORTLAND, OR
986
CASCADE MOUNTAINS
OKANOGAN
CHELAN
988
WENATCHEE
988
KITTITAS
YAKIMA
989
YAKIMA
989
KLICKITAT
DOUGLAS
GRANT
BENTON
FRANKLIN
993
PASCO
993
ADAMS
991
FERRY
STEVENS
PEND OREILLE
991
LINCOLN
SPOKANE
SPOKANE
992/991/990
990
WHITMAN
WALLA WALLA
COLUMBIA
GARFIELD
ASOTIN
994
LEWISTON, ID
994

Exhibit 16

NUMBER OF RURAL AND STAR ROUTE ADDRESSES (Ω) (STATE TOTAL: 201,182)
NUMBER OF POST OFFICE BOXES (Δ) (STATE TOTAL: 142,854)

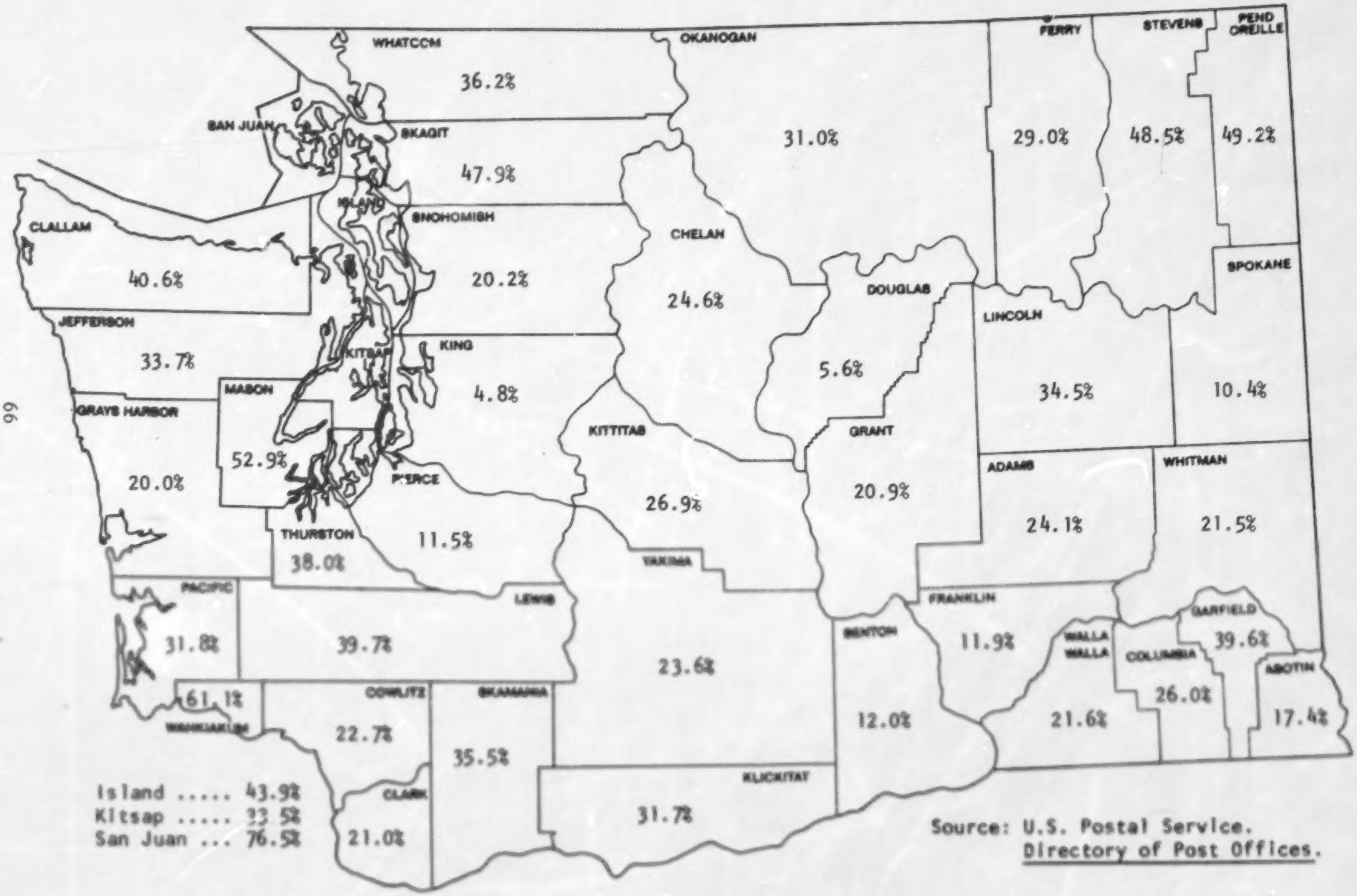

WHATCOM
10,992Ω
4,826Δ
OKANOGAN
2,934Ω
6,291Δ
FERRY
373Ω
872Δ
STEVENS
3,037Ω
2,176Δ
PEND OREILLE
1,055Ω
1,466Δ
SAN JUAN
SKAGIT
9,073Ω
3,232Δ
ISLAND
SNOHOMISH
19,234Ω
8,291Δ
CLALLAM
5,111Ω
3,796Δ
CHELAN
3,631Ω
4,300Δ
DOUGLAS
356Ω
1,173Δ
LINCOLN
1,159Ω
2,510Δ
SPOKANE
11,033Ω
8,385Δ
JEFFERSON
1,279Ω
1,054Δ
KITSAP
KING
19,753Ω
20,548Δ
MASON
4,064Ω
1,861Δ
GRAYS HARBOR
4,298Ω
5,595Δ
KITTITAS
2,426Ω
2,191Δ
GRANT
3,236Ω
4,782Δ
ADAMS
1,062Ω
1,387Δ
WHITMAN
2,985Ω
4,009Δ
PIERCE
16,689Ω
10,188Δ
THURSTON
11,047Ω
3,407Δ
YAKIMA
12,269Ω
6,893Δ
PACIFIC
1,796Ω
3,384Δ
LEWIS
6,594Ω
4,079Δ
BENTON
2,924Ω
2,201Δ
FRANKLIN
1,114Ω
1,728Δ
WALLA WALLA
3,253Ω
1,994Δ
COLUMBIA
400Ω
326Δ
GARFIELD
411Ω
678Δ
ASOTIN
867Ω
483Δ
WAHKIAKUM
COWLITZ
5,677Ω
3,439Δ
SKAMANIA
750Ω
757Δ
CLARK
10,174Ω
2,924Δ
KLICKITAT
1,461Ω
3,121Δ

Island	4,424Ω 1,683Δ
Kitsap	12,361Ω 5,276Δ
San Juan	1,093Ω 1,050Δ
Wahkiakum ...	787Ω 498Δ

Source: U.S. Postal Service. *Directory of Post Offices*.

Exhibit 17

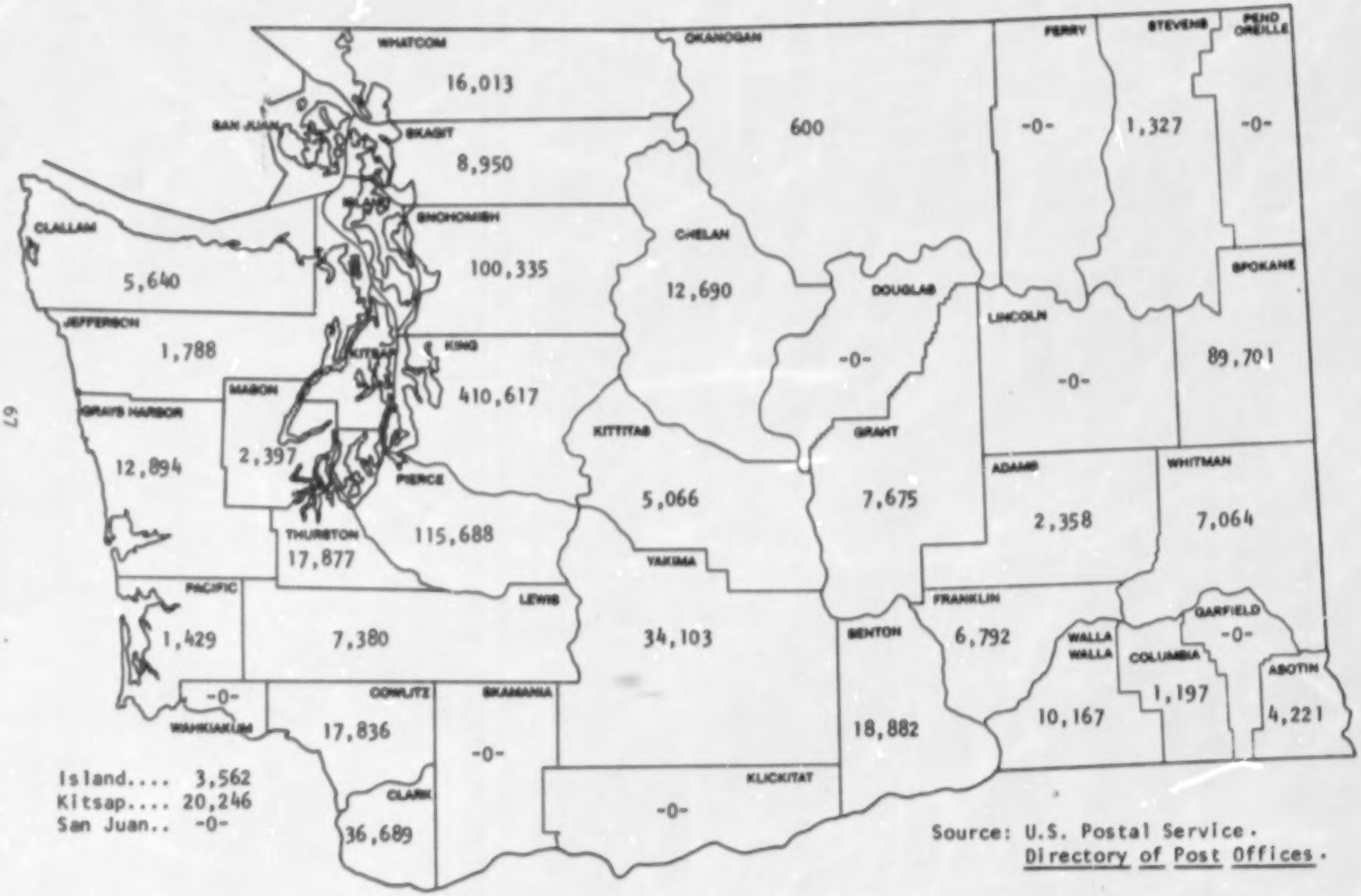
PERCENT OF POPULATION SERVED THROUGH RURAL OR STAR ROUTE DELIVERIES


WHATCOM
36.2%
OKANOGAN
31.0%
FERRY
29.0%
STEVENS
48.5%
PEND OREILLE
49.2%
SAN JUAN
SKAGIT
47.9%
ISLAND
SNOHOMISH
20.2%
CLALLAM
40.6%
CHELAN
24.6%
DOUGLAS
5.6%
LINCOLN
34.5%
SPOKANE
10.4%
JEFFERSON
33.7%
KITSAP
KING
4.8%
MASON
52.9%
GRAYS HARBOR
20.0%
KITTITAS
26.9%
GRANT
20.9%
ADAMS
24.1%
WHITMAN
21.5%
PIERCE
11.5%
THURSTON
38.0%
YAKIMA
23.6%
PACIFIC
31.8%
LEWIS
39.7%
BENTON
12.0%
FRANKLIN
11.9%
WALLA WALLA
21.6%
COLUMBIA
26.0%
GARFIELD
39.6%
ASOTIN
17.4%
61.1%
WAHKIAKUM
COWLITZ
22.7%
SKAMANIA
35.5%
KLICKITAT
31.7%
CLARK
21.0%
Island 43.9%
Kitsap 33.5%
San Juan ... 76.5%

Source: U.S. Postal Service. Directory of Post Offices.

Exhibit 18

NUMBER OF CITY RESIDENTIAL ADDRESSES
(State Total: 981,094)


WHATCOM
16,013
OKANOGAN
600
FERRY
-0-
STEVENS
1,327
PEND OREILLE
-0-
SAN JUAN
SKAGIT
8,950
CLALLAM
5,640
ISLAND
SNOHOMISH
100,335
CHELAN
12,690
DOUGLAS
-0-
LINCOLN
-0-
SPOKANE
89,701
JEFFERSON
1,788
KITSAP
KING
410,617
MASON
2,397
GRAYS HARBOR
12,894
KITTITAS
5,066
GRANT
7,675
ADAMS
2,358
WHITMAN
7,064
PIERCE
115,688
THURSTON
17,877
YAKIMA
34,103
PACIFIC
1,429
LEWIS
7,380
FRANKLIN
6,792
BENTON
18,882
WALLA WALLA
10,167
COLUMBIA
1,197
GARFIELD
-0-
ASOTIN
4,221
-0-
WAHKIAKUM
COWLITZ
17,836
SKAMANIA
-0-
KLICKITAT
-0-
CLARK
36,689

Island.... 3,562
Kitsap.... 20,246
San Juan.. -0-

Source: U.S. Postal Service. Directory of Post Offices.

Exhibit 19

PROJECTED URBAN/RURAL CIRCULATION

RURAL COUNTIES	NUMBER OF STAR AND RURAL ROUTE DELIVERIES	URBAN COUNTIES*	NUMBER OF STAR AND RURAL ROUTE DELIVERIES
Adams	1,062	Clark	10,174
Asotin	867	King	19,753
Benton	2,924	Kitsap	12,361
Chelan	3,631	Pierce	16,689
Clallam	5,111	Snohomish	19,234
Columbia	400	Spokane	11,033
Cowlitz	5,677	Thurston	11,047
Douglas	356	Whatcom	10,992
Ferry	373	Yakima	12,269
Franklin	1,114		
Garfield	411		
Grant	3,236		
Grays Harbor	4,298		
Island	4,424		
Jefferson	1,279		
Kittitas	2,426		
Klickitat	1,461		
Lewis	6,594		
Lincoln	1,159		
Mason	4,064		
Okanogan	2,934		
Pacific	1,796		
Pend Oreille	1,055		
San Juan	1,093		
Skagit	9,073		
Skamania	750		
Stevens	3,037		
Wahkiakum	787		
Walla Walla	3,253		
Whitman	2,985		
TOTALS	77,630		123,552
CIRCULATION RATIO	7.0		3.1
PROJECTED CIRCULATION	543,410		383,011
PROJECTED TOTAL CIRCULATION		926,421	
PROJECTED CIRCULATION TO 50,841 INDIVIDUALS		75,000	
TOTAL PROJECTED CIRCULATION		1,001,421	

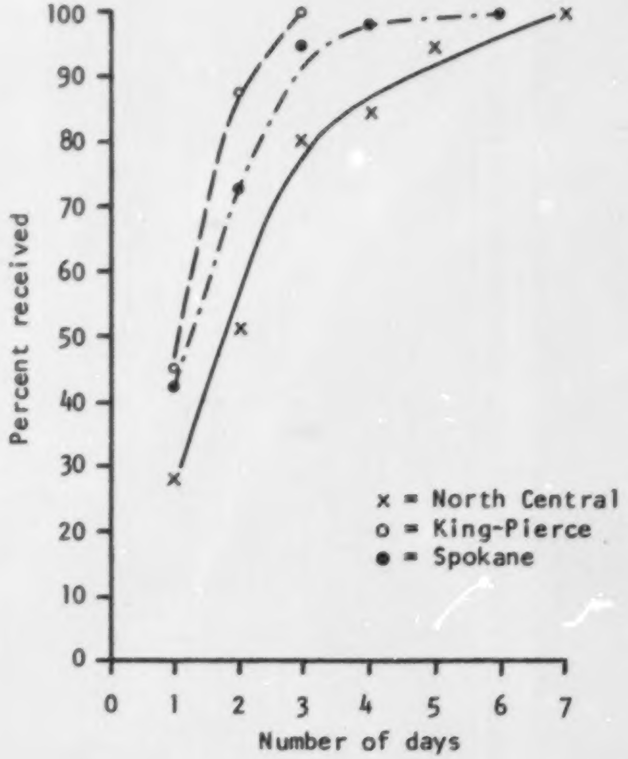
*Urban defined as "a part of, or easily accessible (geographically) to major urban centers."

Exhibit 20

MAIL PATTERNS, STATEWIDE

Mailings from 3 Centers to All Patrons

	$\overline{x}$	σ
North Central	1.8	0.7
King-Pierce	1.7	0.7
Spokane	1.9	0.7



Mailings from All Patrons to 3 Centers

	$\overline{x}$	σ
North Central	2.6	1.6
King-Pierce	2.4	1.2
Spokane	2.6	1.0

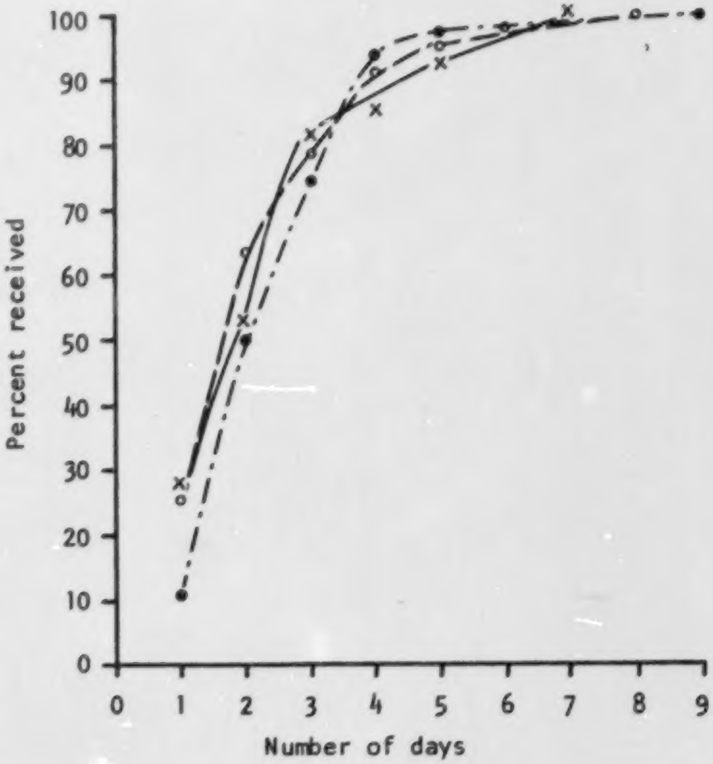
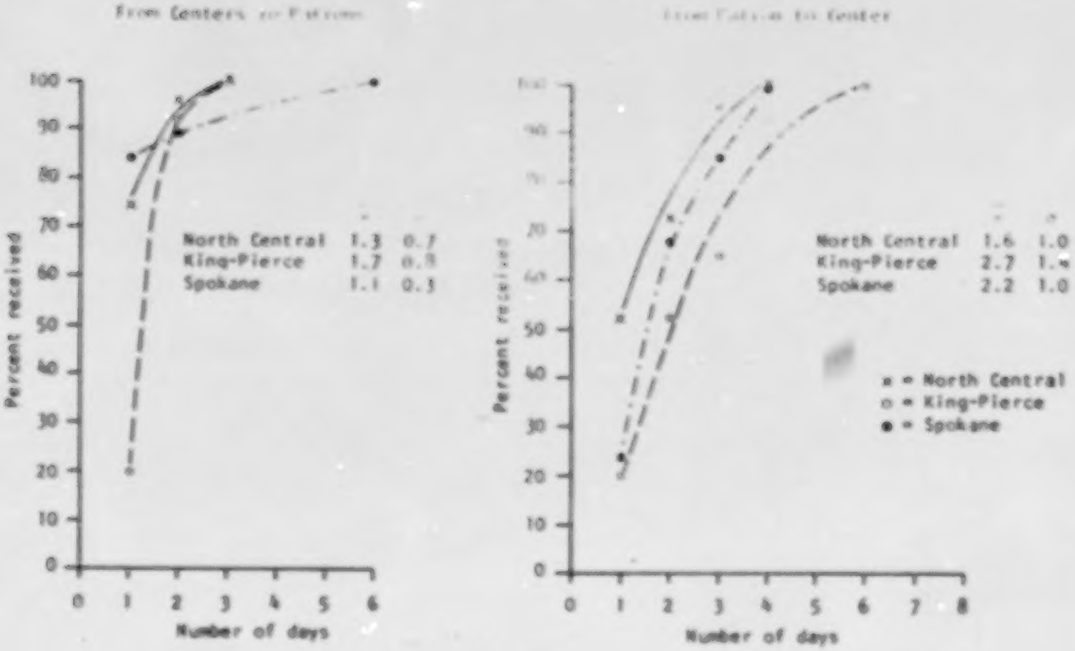


Exhibit 21

MAIL PATTERNS TO AND FROM ADDRESSES EAST OF CASCADE MOUNTAINS AND TO AND FROM ADDRESSES WEST OF CASCADE MOUNTAINS

EAST OF CASCADE MOUNTAINS



WEST OF CASCADE MOUNTAINS

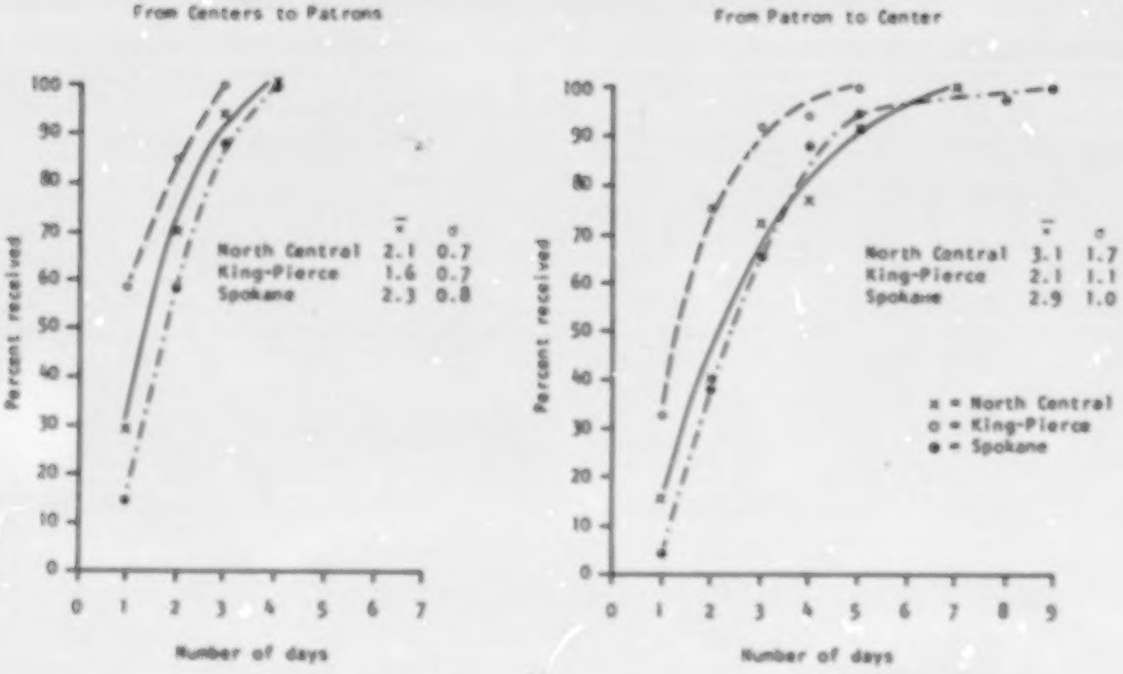
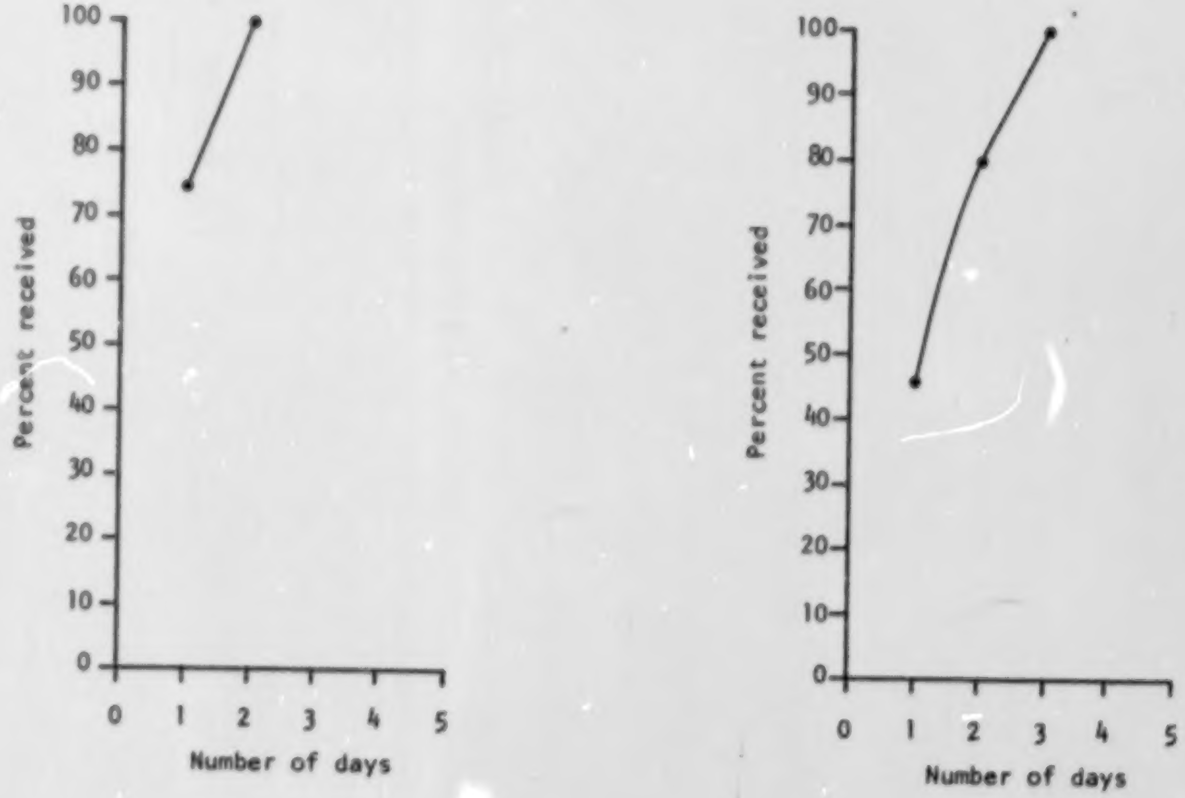


Exhibit 22

MAIL PATTERNS, COMPOSITE OF ALL MAILINGS TO AND FROM CENTERS WITHIN LOCAL REGION



From Centers to Local Patrons

$\overline{x} = 1.3$

$\sigma = 0.3$

From Local Patrons to 3 Centers

$\overline{x} = 1.7$

$\sigma = 0.8$

Exhibit 23

PRESENT MAIL ORDER OPERATIONS AND PROJECTED STATEWIDE OPERATION

	North Central	King-Pierce	Spokane County	Statewide Projections
Total Annual Circulation	109,415	68,823	29,910	1,001,421
Number of Households Receiving Catalogs	15,624	28,000	8,000	201,182
Number of Individuals Receiving Catalogs	—	—	—	50,000
Total Number of Addresses Receiving Catalogs	—	—	—	251,182
Total Annual Orders	19,505	12,804	5,191	178,832[1]
Average Number of Items per Order	5.6	5.3	5.8	5.6
Total Annual Packages Mailed	34,489	23,657	6,229	312,668
Average Number of Items per Package	3.2	2.9	4.8	3.2
Full Time Equivalent Staff	6.0	4.25	1.25[2]	—[3]
Annual Items per Employee	18,236	15,294[4]	17,594	—
Area for Mail Order Operations	1846 sq ft	1950 sq ft	500 sq ft	Shelving 5000 sq ft Staff 50 sq ft each
Expenditures	$69,489	$98,162[4,5]	$14,006	—
Cost per Circulation	$ .635	$ 1.43[4,5]	$ .47[2]	—
Titles Held[6]	2,000	3,601	1,298	2,500
Volumes Held	44,389	51,679	10,308	212,500[7]

[1] Households: 165,432; Individuals: 13,400

[2] Spokane utilizes regular staff as available for mail order operations

[3] Fifty-five (55) based on North Central work flow; later reduced by simulation results to 36

[4] King - Pierce handles both films and cassettes which are more time-consuming and expensive than printed materials

[5] Includes three year amortization of remodeling costs

[6] Includes all types of materials

[7] Average of 85 copies per title

Exhibit 24

ON-GOING EXPENDITURES AND PRESENT MAIL ORDER OPERATIONS (1973)

	North Central	King-Pierce	Spokane County
Salaries and Benefits	$39,599	$40,901	$ 7,160
Books[1]	10,159	25,094	2,340
Supplies	4,861	3,613	1,104
Postage[2]	10,394	13,000	2,016
Catalogs	4,068	9,522	1,252
Physical Facility	3,599	4,704	n.a.
Miscellaneous	408	1,328	134
Totals	$69,489	$98,162	$14,006

[1] Books only
[2] See Exhibit 25 for average cost per package

Exhibit 25

WORKING RATIOS

	North Central	King-Pierce	Spokane County	Statewide Projections
$\frac{\text{Salaries}}{\text{No. Staff}}$ =	$6,600	$9,624	$5,728	$7,000
$\frac{\text{Book Expenditures}}{\text{Circulation}}$ =	.09	.36	.08	.075
$\frac{\text{Supplies}}{\text{Circulation}}$ =	.04	.05	.04	.04
$\frac{\text{Postage}}{\text{No. Packages}}$ =	.30	.55	.32	.30
Cost per Catalog	.054	.054	.128	.045
$\frac{\text{Miscellaneous Costs}}{\text{Circulation}}$ =	.004	.09	.004	.004
$\frac{\text{Facility Costs}}{\text{Circulation}}$ =	.03	.07	n.a.	.03

Exhibit 26

MAP OF SIMULATED MOD CENTERS

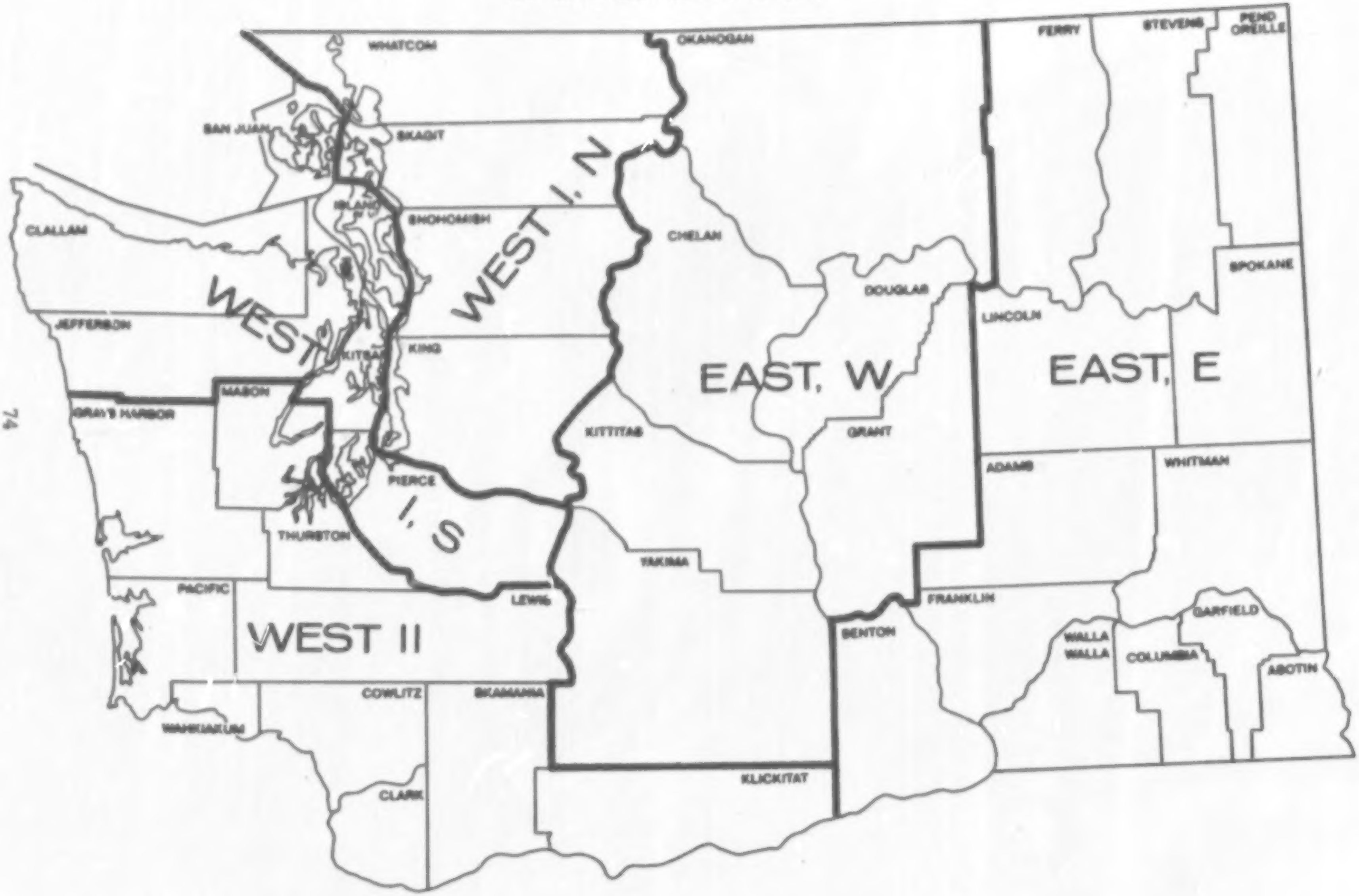

WHATCOM
OKANOGAN
FERRY
STEVENS
PEND OREILLE
SAN JUAN
SKAGIT
WEST I, N
CLALLAM
ISLAND
SNOHOMISH
CHELAN
DOUGLAS
SPOKANE
LINCOLN
WEST
JEFFERSON
KITSAP
KING
EAST, W
EAST, E
MASON
GRAY'S HARBOR
KITTITAS
GRANT
ADAMS
WHITMAN
PIERCE
I, S
THURSTON
YAKIMA
PACIFIC
LEWIS
FRANKLIN
GARFIELD
BENTON
WALLA WALLA
COLUMBIA
ASOTIN
WEST II
COWLITZ
SKAMANIA
WAHKIAKUM
CLARK
KLICKITAT

Exhibit 27

COMPARATIVE ESTIMATED STAFFING REQUIREMENTS FOR MOD SERVICE

Configuration	Man Years			
	Direct Service and Administration -A-		Total Including Support Functions -B-	
I. Serving all state:				
1 Center		29		36
2 Centers		30		38
East of Cascades	10		12	
West of Cascades	20		26	
3 Centers		31		40
East	10		12	
West I	13		18	
West II	8		10	
4 Centers		32		41
East	10		12	
West I, N	8		11	
West I, S	6		8	
West II	8		10	
5 Centers		33		43
East, W	5		6	
East, E	6		8	
West I, N	8		11	
West I, S	6		8	
West II	8		10	
14 Centers		42		63
II. Serving districts only:				
Asotin County	1/2		1	
Fort Vancouver Reg.	3		4	
King - Pierce*	5		7	
Kitsap Regional	3		4	
Mid-Columbia Regional	2		3	
North Central Reg.*	3		4	
North Olympic Reg.	2		3	
Sno-Isle Regional	4		6	
Spokane County*	2		3	
Timberland Regional	5		7	
Whatcom County	2		3	
Whitman County	1		3	
Yakima Valley Reg.	2		4	
Totals	34 1/2		52	

*These figures differ from actual operations, since circulation is posited on demographic figures and tasks on North Central Regional Library timings.

Exhibit 28

ESTIMATED ANNUAL COSTS FOR MOD CENTERS SERVING STATE OF WASHINGTON[1]

	Salaries and Benefits	Books	Supplies	Postage	Catalogs	Physical Facilities	Misc	Total	Cost per Circulation[2]
1 Center	$203,000	$222,800	$30,000	$94,000	$47,000	$12,900	$ 1,000	$610,700	.609
2 Centers	210,000	222,800	30,000	94,000	47,000	13,000	1,000	617,800	.616
3 Centers	217,000	222,800	30,000	94,000	47,000	13,100	1,200	625,500	.623
4 Centers	224,000	222,800	30,000	94,000	47,000	13,200	1,500	632,500	.631
5 Centers	231,000	222,800	30,000	94,000	50,000	13,300	2,000	643,100	.641
14 Centers	294,000	222,800	30,000	94,000	60,000	14,200	3,500	718,500	.717
Districts - not serving all state	245,000	253,000	22,900	71,100	61,600	22,000	7,800	683,400	.901

ESTIMATED ANNUAL COSTS FOR SERVING DISTRICT MOD CENTERS[1]

	Salaries and Benefits	Books	Supplies	Postage	Catalogs	Physical Facilities	Misc	Totals
Asotin County	$ 7,000	$ 2,100	$ 200	$ 600	$ 300	$ 200	$ 100	$ 10,500
Fort Vancouver Regional	21,000	16,700	1,500	4,700	4,500	1,600	500	50,500
King - Pierce	35,000	43,800	4,000	12,300	15,000	3,800	1,500	115,200
Kitsap Regional	21,000	14,000	1,200	3,800	4,200	1,300	400	45,900
Mid-Columbia Regional	14,000	9,800	900	2,800	1,500	800	400	30,200
North Central Regional	21,000	25,500	2,300	7,200	3,800	2,200	600	62,600
North Olympic Regional	14,000	12,200	1,000	3,400	1,700	1,100	400	33,800
Sno-Isle Regional	28,000	32,000	2,900	9,000	[illegible],300	2,800	1,000	84,000
Spokane County	14,000	12,300	1,000	3,500	4,000	1,100	400	36,300
Timberland Regional	35,000	52,100	4,700	14,700	9,400	4,400	1,300	121,600
Whatcom County	14,000	11,700	1,[illegible]	3,300	3,500	1,100	400	35,000
Whitman County	7,000	7,100	1,000	2,000	1,000	600	300	19,000
Yakima Valley Regional	14,000	13,700	1,200	3,800	4,400	1,200	500	38,800
Totals	$245,000	$253,000	$22,900	$71,100	$61,600	$22,000	$ 7,800	$683,400

---

[1] Assuming central purchasing, processing, and catalog production and mailing

[2] Circulation estimates: all-state = 1,002,720; districts = 758,200

Exhibit 29

ESTIMATED ANNUAL WORKLOADS FOR SIMULATED CENTERS TO SERVE ALL STATE

Configuration	Addresses	Circulation	Orders	Packages	Volumes Added Per Year
1 CENTER	252,000	1,002,700	179,000	313,300	222,800
2 CENTERS					
East	64,600	305,800	54,600	95,600	68,000
West	187,500	696,800	124,400	217,800	154,800
3 CENTERS					
East	64,600	305,800	54,600	95,600	68,000
West I	137,500	448,000	80,000	140,000	99,600
West II	50,000	248,800	44,400	77,700	55,300
4 CENTERS					
East	64,600	305,800	54,600	95,600	68,000
West I, N	86,700	260,000	46,400	81,200	57,800
West I, S	50,800	188,100	33,600	58,800	41,800
West II	50,000	248,800	44,400	77,700	55,300
5 CENTERS					
East, W	28,900	132,100	23,600	41,300	29,400
East, E	35,700	173,700	31,000	54,300	38,600
West I, N	86,700	260,000	46,400	81,200	57,800
West I, S	50,800	188,100	33,600	58,800	41,800
West II	50,000	248,800	44,400	77,700	55,300
14 CENTERS					
Average load	18,000	71,600	12,800	22,400	16,000

Exhibit 30

ESTIMATED ANNUAL WORKLOADS FOR MOD SERVICE IN DISTRICT LIBRARIES

District Library	Addresses	Circulation	Orders	Packages	Volumes Added Per Year
Asotin County	1,074	6,400	1,100	2,000	2,100
Fort Vancouver Regional	14,452	50,100	9,000	15,700	16,700
King - Pierce	48,793	131,500	23,500	41,100	43,800
Kitsap Regional	13,949	40,700	7,300	12,700	14,000
Mid-Columbia Regional	4,805	29,400	5,300	9,200	9,800
North Central Regional	12,406	76,500	13,700	24,000	25,500
North Olympic Regional	5,658	36,600	6,500	11,400	12,200
Sno-Isle Regional	27,366	96,200	17,200	30,100	32,000
Spokane County	12,883	37,000	6,600	11,600	12,300
Timberland Regional	31,087	156,400	27,900	48,900	52,100
Whatcom County	11,625	35,000	6,300	10,900	11,700
Whitman County	3,232	21,300	3,800	6,700	7,100
Yakima Valley Regional	14,319	41,100	7,300	12,800	13,700
Totals	197,611	958,200	135,500	237,100	253,000

APPENDICES

APPENDIX A

REPORT OF ON-SITE VISITS TO MOD CENTERS IN WASHINGTON STATE

ACCOUNT OF VISIT TO KING-PIERCE COUNTIES' MAIL ORDER PROGRAM, TACOMA, 17 OCTOBER 1973

In 1971, funding was requested from the State Library for initiating a mail order delivery system, but not received because funds were unavailable at that time. In 1972, the Pierce County Library and King County Library System established a joint service on their own, beginning operation in May 1972. This is an effort to serve people who cannot meet bookmobile schedules and/or are housebound. Pierce County is responsible for the operation, with reimbursement from King County for the service there. Mailings of the catalog are selective, to rural route boxes and the homebound. The mail order service does not in general reach into the incorporated areas covered by the municipal libraries in Seattle and Tacoma. Pierce County serves about 15,000 households with the mail order service; King County, about the same. The mail order budget is $120,000.

The collection includes 2,500 to 3,000 paperbacks, 150 hard cover large type books, 250 films, 400 cassettes, and 15 to 20 magazine titles. The chief vendor used is a paperback jobber in Seattle; selection is based chiefly on flyers from paperback dealers. No weeding routine has yet been developed.

The catalog is printed and mailed by a local printer; annotations are written by library staff. It was not possible to use the North Central Regional Library's mail order catalog, since some of the books listed were no longer available for purchase. The order card for each catalog is color-coded, so that response can be assessed. There seemed to be some concern that extensive demand not be encouraged, since finances limit the ability of the system to respond to requests. Ambivalence was apparent, with a strong urge also present toward building circulation.

A package answering a patron request contains books, catalog supplements, blank order cards, return address label, stamps and paper tape for reclosing the bag. Each bag serves for one to six round trips. Most requests are handled on the day received, except for interlibrary loan or in times of peak seasonal loads. Catalogs are mailed out in frequent batches rather than all at one time; this helps to even out the load of requests. A new catalog is printed about every five months, so that several will be in various stages of mailing to various segments of the service area at any one time. The operation can handle fifty requests per clerk per day, including shelving returns, maintaining card files, handling overdues, keeping statistics, etc. Staff includes three clerks, a part-time high school student, and a librarian as head of the section. The largest backlog ever encountered was about 200 requests, after a large mailing of a catalog; spreading of mailings has alleviated this problem. The day's routine starts with handling of back orders from the previous day, then opening the incoming mail, shelving books, sorting and tabulating orders, assembling books to be mailed out, packaging and turning over to post office, recording cassettes, inspecting, cleaning, and checking films. Mail arrives once a day, in the morning, and goes out once, in the afternoon.

The on-site visit offered some evidence that the staff was not pressed to keep up with the operation. Indeed there seemed to be a proliferation of files which might be the result of an overabundance of staff time. The system seemed to be smoothly run and the service is reaching people who could not otherwise be served by a library.

ACCOUNT OF VISIT TO NORTH CENTRAL REGIONAL LIBRARY, WENATCHEE, 18 OCTOBER 1973

The mail order delivery service at North Central Regional Library was a pioneering effort and has received national attention for its leadership in exploring a new avenue of library services. The operation was begun in 1968 as an attempt to equalize library access to all communities throughout the nearly 15,000 square mile region served by North Central; start-up costs were funded through a Library Services and Construction Act grant. It is viewed as an integral part of the service complex, offering supplemental service where branch library hours and location are not convenient to would-be patrons. The region had three bookmobile centers which have been phased out since establishment of the mail order system; the bookmobiles proved more expensive per circulation and users found mail order a more convenient method.

Originally offered to only one county as a pilot test, the mail order delivery has gradually been expanded to cover all five counties in the North Central region. The population in this area is almost entirely rural in composition, with patrons living up to 100 miles from a branch library which may be open only 20 hours a week. The catalogs are mailed to 15,000 rural route and post office boxholders; each receives three catalogs a year plus flyers when they receive materials. Circulation is still growing steadily and it is the opinion of the staff that this trend can be continued almost indefinitely with suitable marketing techniques. These techniques include good annotations in the catalogs, illustrations accompanying some annotations, wide distribution of catalogs, information to patrons on non-listed books being available, response to reference questions, etc. Indeed, with circulation growth in a given area, mail order service has proved to be a forerunner of new branch libraries in that it encouraged demand and interest in establishment of a local in-library service.

The staff's daily routine begins with unpacking the incoming mail and shelving returned books. Then order cards are sorted, with non-catalog-listed items referred elsewhere, books are pulled from the mail order collection shelves, back orders are filled (cued by a notice on the shelf at re-shelving time), and packaging and delivery to the post office are completed by 3:30 p.m. The operation employs no professionally-trained librarians but the head of the operation is very able and brings much energy, dedication, and extensive library experience to the job.

As observed, the operation seemed very efficiently run and looked highly professional in that it was serving well the purpose for which it has been designed.

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*During the course of this study, the Walla Walla County Library Board contracted with the North Central Regional Library to provide MOD service to the rural residents of Walla Walla County.

ACCOUNT OF VISIT TO SPOKANE COUNTY LIBRARY, SPOKANE, 19 OCTOBER 1973

This mail order operation was begun in January 1971 with Library Services and Construction Act funding; catalogs were sent to nursing homes. In September 1971, 7,500 catalogs were mailed to people in the service area and in four surrounding counties who received Old Age Assistance and Disability Assistance. A later mailing included recipients of Aid to Families with Dependent Children. In November 1972, catalogs were mailed to a general group of rural route and post office boxholders; at the time of the interview, catalogs were reaching 8,000 households. The catalogs which were mailed to AFDC families resulted in increased juvenile circulation, though the titles in the collection are less than 10 percent juvenile. It was discovered that many nursing home patrons have difficulty reading the small print contained in paperbacks, and large type books were added to the mail order collection for them. A special catalog for large type books is produced quarterly and the large type collection is maintained by a standing order system. The paperback collection now has over 1,000 titles, with about twenty a month added and a few deleted. There are 400 large type titles. The paperback collection is 75 percent fiction. Extra copies of highly popular titles are acquired locally as reserve lists pile up. It was estimated that there is a six-week lag between publication of a paperback title and its being available for circulation in Spokane's system.

Mail order service is viewed as building use of libraries in general. Some MOD books are returned to branch libraries, thereby bringing new patrons into the library. It is felt by the Spokane staff that MOD has contacted a whole segment of previous non-users.

The Spokane County Library's mail order delivery service is operated highly informally, the work almost fitting into the interstices of the staff's other tasks. While this results in a seemingly low-cost operation, it also means that the traffic through the system is held at a low level, lest the staff time available be overtaxed. The people responsible for the operation are dedicated to the service, convinced that they are reaching a group of users heretofore unable to access library materials.

COMMENTS ON OBSERVED PROCEDURES

Collection

Data were gathered on collection-building and -maintenance activities. The quality of the collections was not weighed except as the materials' attractiveness to users is directly reflected in circulation figures. It is assumed that a strong effort is made to select books and other materials which will draw high use; a collection of 2,000 titles of which 1,500 are represented by at least one circulation at any given time is obviously a much more successful, much more cost-effective operation than one of 3,000 with only the same 1,500 titles in use. Since the listing of titles in the catalog is limited by printing costs, it is necessary to maintain a highly current, heavy demand collection. Experience has shown that a series of four catalogs a year, with each catalog sent in small weekly batches to different routes, will smooth out the demand so that orders arrive at a fairly even rate. And a catalog of about 500 titles seems suitable in terms of cost and in the variety of materials that can be offered to patrons. Thus, in a given year 2,000 titles might be listed, with a gradual weeding of the non-used titles and steady additions of new and popular titles as they are published. These latest additions are listed in short flyers which are tucked into outgoing orders so that active users will have prompt access to new acquisitions. Therefore, the collection at any one time might contain between 2,000 and 2,500 titles.

Staff members of the existing centers in Washington felt that book selection, annotation, and catalogs must be tailored to the clientele of each area. It appears to the investigators that the similarities among libraries, areas, and clientele are much greater than the differences; MOD centers coul be almost identical throughout the state. Book selection and catalog preparation are among the more enjoyable tasks of the MOD operation, and each center would be reluctant to give up these functions. However, if the service is to be offered to the entire state, administrative decisions on that level should be based on best cost and service factors. In fact, it may well be feasible and most economic to purchase the annotated catalogs along with the books from a responsible vendor. It has not been within the scope of this study to analyze vendors' services, but it seems highly probable that with the prospect of servicing such a large-scale annual purchase, a major vendor would set up a special staff and offer selection, processing, annotation, and catalogs at a cost below that which could be achieved in-house at a MOD center. Arrangement might also be made for the lease-purchase of materials (as McNaughton Plan from Bro-Dart) wherein after a certain time books still in good condition can be returned to the vendor and a portion of the price credited toward lease/purchase of newer materials.

The MOD catalog should strongly emphasize the availability of materials other than those titles listed in the catalog. MOD staff members state that heavy readers promptly read out a catalog, and flyers become their major resource until the next catalog arrives. Since titles in the flyers will be incorporated in the new catalog, the chief gain for the MOD operation is to have spread demand for the new titles over a pre-catalog period. These heavy readers will have read many titles from the next catalog, and will exhaust its listings even more quickly; they must be urged to request non-listed titles. This category of patrons has always been dissatisfied with bookmobile service because of the limited selection available; MOD can offer more titles but wider resources must be accessed in order to achieve satisfaction.

A report from the North Central Regional Library states:

> "During the first year or two of the program, orders for non-catalog items represented a surprisingly small percentage of the total. However, between 1969 and 1972, orders for non-catalog items increased at a rate 40 percent greater than the [percentage] increase in circulation."

The response, at first tentative, grows rapidly as users find that their requests for non-listed items are filled. Each of these requests will be more costly than a regular MOD request. since they must be referred to a regular library rather than filled by a book off the MOD shelf. But if library service is the goal, then the total resources of all libraries must be available to supplement the MOD catalog.

Staff Procedures

It is strongly recommended that manual files in any MOD operation be kept to a minimum. For example, the subject file which was being constructed in one of the centers visited is of most questionable value in this type of non-cumulative collection. Subject requests can and should be referred to a regular library where search tools are already in existence.

The routines for handling reserve books should be so simplified that minimal files are maintained. A possible procedure is to place the list of waiting patrons in the shelf space where the title will be shelved on return, so that no special files need be consulted but rather the existence of a reserve on the title will be automatically discovered at reshelving time.

Another policy which can result in considerable savings in staff time is to ignore overdues. Even where there are reserve lists for the title, the original date due slip can be sent out with the notation "Others are Waiting" so that a higher probability of a considerate response can be expected without followup. Experience in the North Central Regional Library shows that a negligible number of books are never returned--and their value does not begin to justify the expenditure of staff time on routine overdue notices. Renewal procedures also could be greatly diminished by relaxing emphasis on due dates, though there will be some conscientious patrons who will desire renewals as the due date is passed.

Data on times for processing and quantities of requests were provided by each of the three centers. In general there seemed to be no major differences in the three operations, or the times for work.

Some gross figures could be derived by relating annual circulation figures to number of full-time-equivalent staff. This gave the following production figure per employee:

	Items per employee per year	Items per employee per day
North Central	18,326	73
King-Pierce	15,294	61
Spokane County	17,594	70

The King-Pierce rate can be at least partially accounted for by the fact that in that operation a sizeable proportion of films and cassettes are distributed.

Costs

It was hoped that a gross rule of thumb for costing could be derived from the experience of the three centers. However, while the cost-per-circulation does hover around the $ .60 to $ .70 range as shown in Exhibit 2, the rate of circulation is several orders of magnitude less than an all-state operation would be expected to carry. This cost rate should probably be considered a maximum, since costs per catalog and per title can be expected to drop in a larger operation.

Policy

Observations in the three extant MOD centers of Washington State revealed considerable ambivalence towards expanding the programs to include new categories of users or to the entire service area, due to possible workload consequences of inviting or enticing the maximum number of readers to request their offerings. Since the raison d'etre of libraries is to provide materials to readers, everyone in the centers was pleased at the reader response to their service. But it seems obvious that none of the three is pushing towards all-out expansion of service as a result of policy decisions concerning the role of Mail Order within the system, or because of staff limitations. There probably exists a sizeable number of unserved individuals and households in these supposedly MOD-served areas. Furthermore, the way to reduce cost per circulation is to increase the circulation, since a certain proportion of the costs remain relatively fixed no matter what the traffic of requests.

There is a possibility that the two MOD centers serving populations near or in major urban centers will never be able to build circulation to the point of economy of scale, since the proportion of the population which cannot go to a library is much lower than in the rural area served by North Central. It is also more expensive to reach an individual in the urban area who needs MOD service. In a rural area catalogs can be bulk mailed to "Rural Boxholder" at a much lower postal rate than individually addressed mail for the elderly and housebound in cities, which is also more expensive in staff time for addressing. Sending catalogs to all city "Occupants" seems, on the basis of present information, overcostly for the number of circulations it is likely to produce. In any case, none of the three centers seem to be putting full effort into increasing circulation, because of the probability that circulation will grow beyond their capacity or funds to handle it.

MAILING TIME TEST

(Number of days in mail from Mail Order Catalog centers to addressee and return to centers)

ADDRESSEE	MONDAY OCTOBER 29, 1973						WEDNESDAY OCTOBER 31, 1973						FRIDAY NOVEMBER 2, 1973					
	NORTH CENTRAL		KING-PIERCE		SPOKANE		NORTH CENTRAL		KING-PIERCE		SPOKANE		NORTH CENTRAL		KING-PIERCE		SPOKANE	
	Sent	Return	Sent	Return	Sent	Return	Sent	Return	Sent	Return	Sent	Return	Sent	Return	Sent	Return	Sent	Return
BELLEVUE *(98006 - Seattle)	2	3	1	2	2	4	2	2	2	2	2	3	3	2	1	2	1	2
BELLINGHAM (98225 - Everett)	3	7	2	2	3	3	2	4	2	2	2	2	3	5	3	1	3	5
BELLINGHAM (98225 - Everett)	3	3	2	2	3	3	3	3	2	2	**	**	**	**	+	3	1	3
BREMERTON (98310 - Tacoma)	1	2	1	1	3	3	2	2	2	2	3	2	3	2	3	1	4	1
CHENEY (98004 - Spokane)	1	2	2	4	1	2	2	2	2	2	2	2	1	1	4	4	1	1
CLARKSTON (99403 - Lewiston)	1	1	2	2	1	2	1	4	2	3	1	4	1	2	3	2	6	4
COLFAX (99111 - Spokane)	2	1	2	1	1	4	2	2	2	3	1	3	3	1	3	**	1	1
EVERETT (98203 - Everett)	1	5	1	2	1	2	1	3	1	3	1	3	1	2	1	1	1	2
KENNEWICK (99336 - Pasco)	1	1	1	6	1	2	1	3	2	2	1	3	3	1	3	3	1	2
LEAVENWORTH (98826 - Wenatchee)	1	1	1	1	1	1	1	3	2	2	2	2	1	1	3	**	1	1
LIBERTY LAKE (99019 - Spokane)	1	1	2	4	1	1	1	3	2	4	1	3	1	1	3	8	1	2
MARYSVILLE (98270 - Everett)	4	5	1	1	2	3	2	2	1	3	2	2	**	3	1	1	**	**
OLYMPIA (Rural Route) (98502 - Olympia)	1	1	1	1	2	4	1	3	1	3	2	2	1	2	1	2	3	2
PORT ANGELES (98362 - Tacoma)	2	7	1	2	3	4	2	3	1	4	2	3	3	4	3	2	3	9
SEATTLE (98115 - Seattle)	2	5	2	5	3	3	2	3	3	2	3	4	4	5	4	5	4	5
TACOMA (98406 - Tacoma)	2	1	2	1	2	4	2	3	2	2	2	6	1	3	1	2	2	3
TACOMA (98406 - Tacoma)	2	1	1	1	2	2	1	3	1	3	2	2	1	1	1	1	3	2
VANCOUVER (98661 - Portland)	2	1	1	5	2	4	2	2	1	3	2	4	3	7	3	1	3	2
YAKIMA (98901 - Yakima)	1	1	1	1	1	2	1	3	2	4	1	3	1	3	3	**	1	2

*(Zip Code - Mail Distribution Center)
**Information not received
+Response invalid

dr. frank b. brouillet
chairman, state library commission
john veblen
vice-chairman, state library commission

washington state library
olympia, washington 98504

maryan e. reynolds
state librarian

October 29, 1973

MEMORANDUM

TO: Heads of Mail Order Programs for Pierce-King Counties, North Central Regional, and Spokane County Libraries

FROM: Mary Jane Pobst Reed mjpr

RE: Testing of Mail Delivery Timings

This is to outline procedures for the mail order delivery test that we discussed previously.

Enclosed are:

1. 60 instruction sheets with return form--a different color is being sent to each mail order center.

   14 district plus 5 municipal libraries = 19 addresses, including your own director.

   19 x 3 mailings each = 57 mailing pieces

2. a list of home addresses for 19 directors of libraries.

Please send 3 mailings to each address, 1 on Monday, 1 on Wednesday, and 1 on Friday, in any sequence of days beginning as soon as possible.

Each mailing should consist of a bag containing a small book (to keep postage minimal), instruction sheet with return form, return label and stamps.

Fill in the date of mailing on each return form.

When you receive the return, please fill in date of receipt.

I will appreciate receiving the return forms from you as soon as possible--say a week from your third mailing. Later return forms can be sent as they arrive.

If you have any questions as to this procedure, please phone me.

Thanks so much for your assistance.

MJPR:rw
enclosures: 60 instruction sheets with return form
copy of memo to directors
stamps--2x57=114 - 6¢ stamps
list of addresses

dr. frank b. brouillet
chairman, state library commission
john veblen
vice-chairman, state library commission

washington
state
library

olympia, washington 98504

maryan e. reynolds
state librarian

October 29, 1973

MEMORANDUM

TO: District Library Directors and Directors of Seattle, Tacoma, Spokane, Everett, and Bellingham Public Libraries

FROM: Mary Jane Pobst Reed MJR

RE: Mail Order Book Delivery Study: Preliminary Investigation of Postal Delivery Schedules

You have received Maryan Reynolds' notification of our receipt of a grant for analyzing factors in design of a mail order delivery pattern which could serve all areas of the state.

As a start, we want to get some sample timings on postal services. The rest of this memo describes that step. Then in November I plan to talk with each of you by phone if we need local information that cannot be derived from the annual statistical issue of the Library News Bulletin and other state agency sources.

In determining whether there should be one or more centers for statewide mail delivery service, and where it or they should be located, one major factor is length of time for postal service from point to point. While this factor is somewhat variable as the seasons roll and the postal system shifts patterns, still we can ascertain some general facts.

As a first rough cut, we are proposing test mailings from the three present mail order programs to other points of the state. The present operations are chosen to minimize the extra effort, materials, and instructions which would be required for other libraries to send mailings; fortuitously, this gives us an eastern, a western, and a central location. For this first try, to keep it simple and test the technique, the addresses used will be home addresses of the library directors to whom this memo is addressed. This will avoid institutional delivery patterns, and give us figures on residential delivery times. We will not be hitting far-out rural areas this time; that can come in a later phase if the technique looks promising.

serves the governor, state legislature, state agencies, libraries, and the citizens of the State of Washington

(OVER)

Each of you will be receiving a total of nine mailings--three book bags from each of the three centers--to provide a representative sampling. Enclosed in each bag will be a book, a return label, stamps, and a form for recording the day received by you, and day when you mail it back to the mail order library. Please fill in the dates, your name and address, replace the form and book in the bag, relabel and stamp the bag, and return promptly. Use of residential mailing facilities rather than your library outgoing mail will be helpful.

If you have any questions or comments, please phone me.

Your cooperation is appreciated.

copies: Linda Phillips, Head of mail order program Pierce-King County Libraries
Boyden Brooks, " " " " " North Central Regional Library
Donna Woolard, " " " " " Spokane County Library

MJPR:rw
enclosures

THIS IS A TEST MAILING RELATIVE TO THE STUDY ON MAIL ORDER DELIVERY OF LIBRARY MATERIALS

PLEASE GO THROUGH THE FOLLOWING STEPS TO ASSIST IN OUR DATA COLLECTION:

1. Immediately on receipt, fill in the information after number 2 on the form below.
2. As soon as possible, return the bag, book, and form to the mail order center which sent it to you. Just before putting it in the mail:
    a. Fill in the information after number 3 on the form.
    b. Relabel and stamp the bag, insert form and book and close bag.
    c. If convenient, mail through a residential facility (postman, pickup at your home, corner postal collection box, or post office).

Thank you,

Mary Jane Pobst Reed

- -

TEST MAILING FOR MAIL ORDER DELIVERY STUDY

1. Mailed from SPOKANE COUNTY LIBRARY ______ Date ____________

2. Received by ______________________ Date ____________

P.O.: ______________________

Zip: ______________________

3. Package mailed to Mail Order Center Date____________

4. Received by Mail Order Center Date____________

mjpr:rw
10/29/73

OUTPUT

This appendix shows the workflow diagram for the generalized mail order delivery operation, program listings, and samples of computer output. Two sets of output are shown here: the first is the result of the simulation of the present MOD operation at North Central Regional Library and the second is from the simulation of the operation of one MOD center serving the entire state of Washington.

The first chart shows clock time at the top (the figure of 10560 is the product of 480 minutes times 22 days) and the block counts: current contents and total number of transactions put through each step. The facility statistics give the percentage of the total time during which that facility (worker or machine) was occupied in processing transactions. (Transactions in the present model are orders, books, and packages.) It is from this set of figures that staffing needs can be derived. The queue statistics show times that transactions stayed in specified stages of the model. The five frequency tables show a tabulation of transaction times required in various operations. Table 1 gives the frequency tabulation of times required for opening packages and returning books to the shelves (one to three minutes for NCRL; one to eight minutes for all-state, indicating some time spent waiting in queue, while workers were busy with prior transactions). Table 2 gives the frequency tabulation for times required to gather items to fill an order for titles listed in the catalog (one to forty minutes in each situation). Table 3 shows the frequency distribution for processing reserve book orders, not including waiting time for books to return from another reader (one to fifty minutes for NCRL, one to seventy for all-state). Table 4 gives frequency tabulations for processing orders for titles not listed in the catalog; the range is one to 170 minutes for NCRL, and up to 220 minutes for the all-state center. Table 5 shows the frequency distribution of times for readying packages for mailing (one to five minutes for NCRL and for all-state, except for one errant package which required seven minutes).

FUNCTIONS

A chief difference between computer and mathematical modeling is that the mathematical approach is usually deterministic. Computer modeling permits probabilistic occurrences through the use of probability distributions which are expressed in functional relationships. These functions are activated as needed in the program, at which time the function referenced will assign an appropriate value to the argument. In some cases, the calculation of this value includes the generation of a random number and further complex computations.

Function FUN2 in the MOD simulation program represents a distribution of the number of items requested on each order card received. When in the simulation an order transaction is received, FUN2 is used to assign between one and ten items to this order.

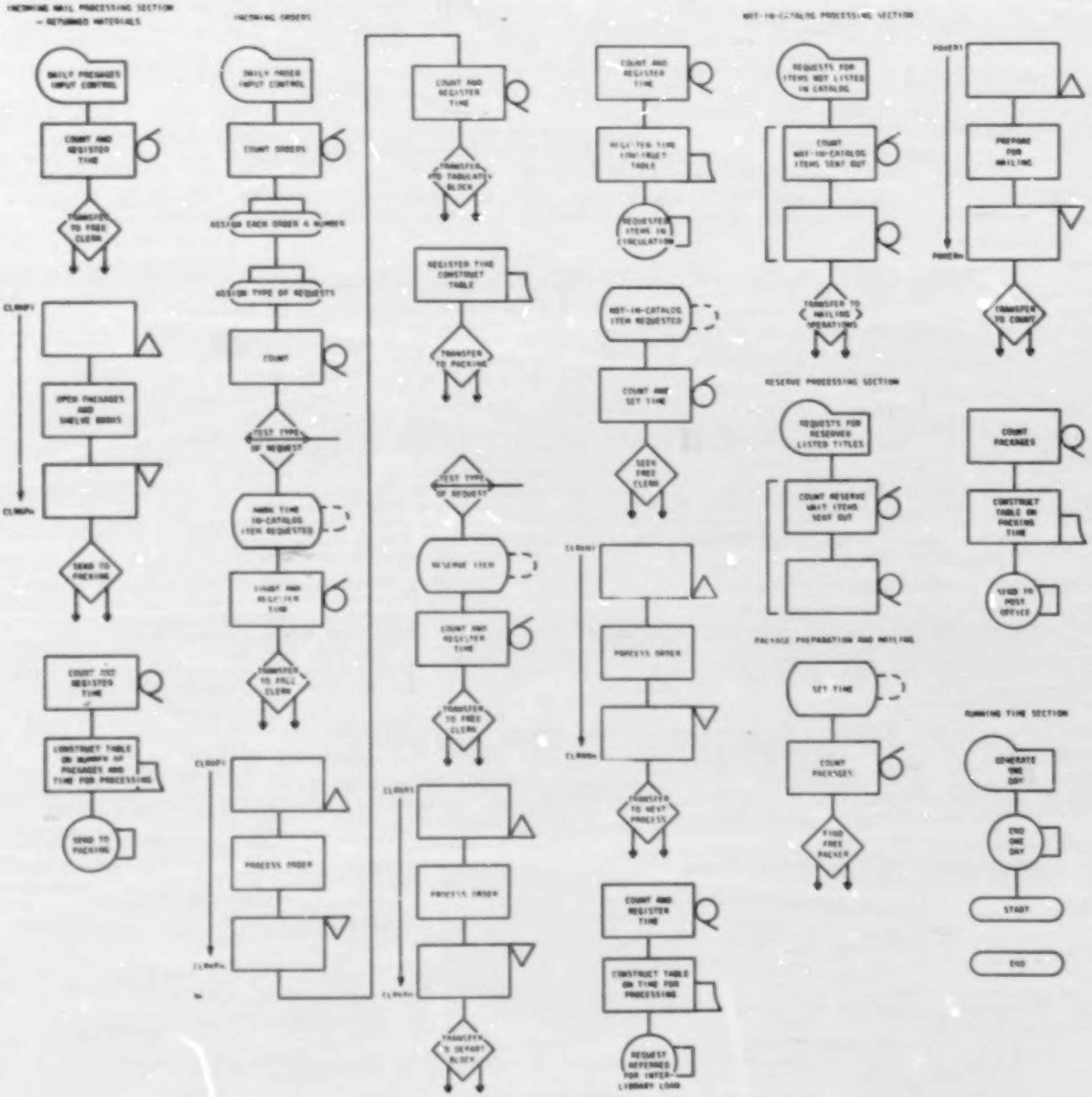
Function FUN3 establishes the nature of the items ordered: titles listed in the MOD catalog, titles not in the catalog (interlibrary loan candidates), or titles in the catalog but on which there are such demands that there are reserve waiting lists.

Functions FUN4, FUN5, and FUN7 assign times for processing each of these types of requests. FUN12 calculates the time necessary to open incoming packages and return books to their places on the shelves. FUN15 computes times for packaging books to send to patrons.

The above functions relate to internal MOD center processing; the four GEN functions relate to the external demand on the MOD system. Function GENA relates to arrival of incoming packages--that is, if a certain number of packages is to be expected per year, then a function is set to input the required number of package transactions in a given length of time from a probability distribution.

Function GENB computes the rate of incoming orders; GENC the rate of receipt of requests for not-in-catalog items; and GEND the rate of requests received for reserve items. The mathematical definitions for these functions are not reproduced in the present report, since they vary with the specific simulation.

WORK FLOW DIAGRAM FOR COMPUTER SIMULATION
LIBRARY-MAIL ORDER DELIVERY


INCOMING MAIL PROCESSING SECTION – RETURNED MATERIALS
DAILY PACKAGES INPUT CONTROL
COUNT AND REGISTER TIME
TRANSFER TO FREE CLERK
CLERK1
OPEN PACKAGES AND SHELVE BOOKS
CLERKn
SEND TO PACKING
COUNT AND REGISTER TIME
CONSTRUCT TABLE ON NUMBER OF PACKAGES AND TIME FOR PROCESSING
SEND TO PACKING
INCOMING ORDERS
DAILY ORDER INPUT CONTROL
COUNT ORDERS
ASSIGN EACH ORDER A NUMBER
ASSIGN TYPE OF REQUESTS
COUNT
TEST TYPE OF REQUEST
MARK TIME IN-CATALOG ITEM REQUESTED
COUNT AND REGISTER TIME
TRANSFER TO FREE CLERK
CLERK1
PROCESS ORDER
CLERKn
COUNT AND REGISTER TIME
TRANSFER TO TABULATE BLOCK
REGISTER TIME CONSTRUCT TABLE
TRANSFER TO PACKING
TEST TYPE OF REQUEST
RESERVE ITEM
COUNT AND REGISTER TIME
TRANSFER TO FREE CLERK
CLERK1
PROCESS ORDER
CLERKn
TRANSFER TO DEPART BLOCK
COUNT AND REGISTER TIME
REGISTER TIME CONSTRUCT TABLE
REQUESTED ITEMS IN CIRCULATION
NOT-IN-CATALOG ITEM REQUESTED
COUNT AND SET TIME
SEEK FREE CLERK
CLERK1
PROCESS ORDER
CLERKn
TRANSFER TO NEXT PROCESS
COUNT AND REGISTER TIME
CONSTRUCT TABLE ON TIME FOR PROCESSING
REQUEST REFERRED FOR INTER-LIBRARY LOAN
NOT-IN-CATALOG PROCESSING SECTION
REQUESTS FOR ITEMS NOT LISTED IN CATALOG
COUNT NOT-IN-CATALOG ITEMS SENT OUT
TRANSFER TO MAILING OPERATIONS
RESERVE PROCESSING SECTION
REQUESTS FOR RESERVED LISTED TITLES
COUNT RESERVE WAIT ITEMS SENT OUT
PACKAGE PREPARATION AND MAILING
SET TIME
COUNT PACKAGES
FIND FREE PACKER
PACKER1
PREPARE FOR MAILING
PACKERn
TRANSFER TO COUNT
COUNT PACKAGES
CONSTRUCT TABLE ON PACKING TIME
SEND TO POST OFFICE
RUNNING TIME SECTION
GENERATE ONE DAY
END ONE DAY
START
END

PROGRAM LISTING

```
              04/29/74      SPECTRA 70 FLOW SIMULATOR INPUT      PAGE    1 (V7)

  BLOCK
  NUMBER    *LOC     NAME      A,B,C,D,E,F,G        COMMENTS                                 CARD
                     JOB       LIBRARY SIMULATION -- MAIL ORDER DELIVERY  --ORDERS--         00001
            *                                                                                00002
            *        ONE TIME UNIT = ONE MINUTE                                              00003
            *                                                                                00004
            *                                                                                00005
            * DISTRIBUTIONS * INPUTS TO SYSTEM  *                                            00006
            *                                                                                00007
            FUN2     FUNCTION                        NUMBER OF ITEMS PER ORDER CARD          00008
                                                                                             00009
            FUN3     FUNCTION                        RATIO OF TYPES OF REQUESTS              00010
                                                                                             00011
            FUN4     FUNCTION                        PROCESSING TIME, IN-CATALOG ITEMS       00012
                                                                                             00013
            FUN5     FUNCTION                        PROCESSING TIME, RESERVE ITEMS          00014
                                                                                             00015
            FUN7     FUNCTION                        PROCESSING NOT-IN-CATALOG ITEMS         00016
                                                                                             00017
                                                                                             00018
            FUN12    FUNCTION                         TIME OPENING PKGS AND SHELVING BOOKS   00019
                                                                                             00020
            FUN15    FUNCTION                         PREPARING PACKAGES FOR MAILING         00021
                                                                                             00022
            GENA     FUNCTION                         RATE OF INCOMING PACKAGES              00023
                                                                                             00024
            GENB     FUNCTION                         RATE OF INCOMING ORDERS                00025
                                                                                             00026
            GENC     FUNCTION                         RATE OF NOT-IN-CATALOG ITEMS           00027
```

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              04/29/74      SPECTRA 70 FLOW SIMULATOR INPUT      PAGE    2 (V7)

  BLOCK
  NUMBER    *LOC      NAME      A,B,C,D,E,F,G       COMMENTS                            CARD

                                                                                        00028
            GEND      FUNCTION                      RATE OF RESERVE ITEMS               00029
                                                                                        00030
                                                                                        00031
            *                                                                           00032
            * TRANSACTION PROCESSING MODEL                                              00033
            *                                                                           00034
            * INCOMING MAIL PROCESSING SECTION                                          00035
            *                                                                           00036
            * LIBRARY MATERIALS RETURNED BY PATRONS                                     00037
            *                                                                           00038
  00001               GENERATE  1,FN$GENA           INCOMING PACKAGES                   00039
  00002     SESAME    QUEUE     RETURN              COUNT PACKAGES RETURNING            00040
  00003               TRANSFER  ALL,CLRKP1,CLRKP8,4                                     00041
  00004     CLRKP1    SEIZE     CLRKP1                                                  00042
  00005               ADVANCE   1,FN$FUN12                                              00043
  00006               RELEASE   CLRKP1                                                  00044
  00007               TRANSFER  ,PROC1                                                  00045
  00008     CLRKP2    SEIZE     CLRKP2                                                  00046
  00009               ADVANCE   1,FN$FUN12                                              00047
  00010               RELEASE   CLRKP2                                                  00048
  00011               TRANSFER  ,PROC1                                                  00049
  00012     CLRKP3    SEIZE     CLRKP3                                                  00050
  00013               ADVANCE   1,FN$FUN12                                              00051
  00014               RELEASE   CLRKP3                                                  00052
  00015               TRANSFER  ,PROC1                                                  00053
  00016     CLRKP4    SEIZE     CLRKP4                                                  00054
```

```
        04/29/74     SPECTRA 70 FLOW SIMULATOR INPUT      PAGE    3 (V7)

 BLOCK
NUMBER   *LOC     NAME      A,B,C,D,E,F,G      COMMENTS                                CARD
00017             ADVANCE   1,FN$FUN12                                                 00055
00018             RELEASE   CLRKP4                                                     00056
00019             TRANSFER  ,PROC1                                                     00057
00020    CLRKP5   SEIZE     CLRKP5                                                     00058
00021             ADVANCE   1,FN$FUN12                                                 00059
00022             RELEASE   CLRKP5                                                     00060
00023             TRANSFER  ,PROC1                                                     00061
00024    CLRKP6   SEIZE     CLRKP6                                                     00062
00025             ADVANCE   1,FN$FUN12                                                 00063
00026             RELEASE   CLRKP6                                                     00064
00027             TRANSFER  ,PROC1                                                     00065
00028    CLRKP7   SEIZE     CLRKP7                                                     00066
00029             ADVANCE   1,FN$FUN12                                                 00067
00030             RELEASE   CLRKP7                                                     00068
00031             TRANSFER  ,PROC1                                                     00069
00032    CLRKP8   SEIZE     CLRKP8                                                     00070
00033             ADVANCE   1,FN$FUN12                                                 00071
00034             RELEASE   CLRKP8                                                     00072
00035    PROC1    DEPART    RETURN                                                     00073
00036             TABULATE  TAB2                                                       00074
00037    SHELF    TERMINATE                                                            00075
         *                                                                             00076
         * INCOMING ORDERS SECTION                                                     00077
         *                                                                             00078
00038             GENERATE  1,FN$GENB          INCOMING ORDERS                         00079
00039             QUEUE     INORDERS                                                   00080
00040    REQ      ASSIGN    2,FN$FUN2          NUMBER OF ITEMS REQUESTED IN ORDER      00081
```

```
 BLOCK
 NUMBER   *LOC     NAME       A,B,C,D,E,F,G        COMMENTS                          CARD
 00041             ASSIGN     3,FN$FUN3            TYPE OF REQUESTS                  00082
 00042             DEPART     INORDERS                                               00083
 00043   TESTABC   TEST E P3,MODA,TESTBC                                             00084
 00044   MODA      MARK       4                                                      00085
 00045             QUEUE      REQ                  COUNT IN-CATALOG ORDERS           00086
 00046             TRANSFER   ALL,CLRK1,CLRK13,5                                     00087
 00047   CLRK1     SEIZE      CLRK1                                                  00088
 00048             ADVANCE    *2,FN$FUN4           TIME TO PROCESS ORDER             00089
 00049             RELEASE    CLRK1                                                  00090
 00050             DEPART     REQ                                                    00091
 00051             TRANSFER   ,PROCO                                                 00092
 00052   CLRK2     SEIZE      CLRK2                                                  00093
 00053             ADVANCE    *2,FN$FUN4           TIME TO PROCESS ORDER             00094
 00054             RELEASE    CLRK2                                                  00095
 00055             DEPART     REQ                                                    00096
 00056             TRANSFER   ,PROCO                                                 00097
 00057   CLRK3     SEIZE      CLRK3                                                  00098
 00058             ADVANCE    *2,FN$FUN4           TIME TO PROCESS ORDER             00099
 00059             RELEASE    CLRK3                                                  00100
 00060             DEPART     REQ                                                    00101
 00061             TRANSFER   ,PROCO                                                 00102
 00062   CLRK4     SEIZE      CLRK4                                                  00103
 00063             ADVANCE    *2,FN$FUN4           TIME TO PROCESS ORDER             00104
 00064             RELEASE    CLRK4                                                  00105
 00065             DEPART     REQ                                                    00106
 00066             TRANSFER   ,PROCO                                                 00107
 00067   CLRK5     SEIZE      CLRK5                                                  00108
```

```
            04/29/74     SPECTRA TO FLOW SIMULATOR INPUT      PAGE    5 (V7)

 BLOCK
NUMBER   *LOC      NAME       A,B,C,D,E,F,G        COMMENTS                              CARD
 00068             ADVANCE    *2,FN$FUN4            TIME TO PROCESS ORDER                 00109
 00069             RELEASE    CLRK5                                                       00110
 00070             DEPART     REQ                                                         00111
 00071             TRANSFER   ,PROCO                                                      00112
 00072   CLRK6     SEIZE      CLRK6                                                       00113
 00073             ADVANCE    *2,FN$FUN4            TIME TO PROCESS ORDER                 00114
 00074             RELEASE    CLRK6                                                       00115
 00075             DEPART     REQ                                                         00116
 00076             TRANSFER   ,PROCO                                                      00117
 00077   CLRK7     SEIZE      CLRK7                                                       00118
 00078             ADVANCE    *2,FN$FUN4            TIME TO PROCESS ORDER                 00119
 00079             RELEASE    CLRK7                                                       00120
 00080             DEPART     REQ                                                         00121
 00081             TRANSFER   ,PROCO                                                      00122
 00082   CLRK8     SEIZE      CLRK8                                                       00123
 00083             ADVANCE    *2,FN$FUN4            TIME TO PROCESS ORDER                 00124
 00084             RELEASE    CLRK8                                                       00125
 00085             DEPART     REQ                                                         00126
 00086             TRANSFER   ,PROCO                                                      00127
 00087   CLRK9     SEIZE      CLRK9                                                       00128
 00088             ADVANCE    *2,FN$FUN4            TIME TO PROCESS ORDER                 00129
 00089             RELEASE    CLRK9                                                       00130
 00090             DEPART     REQ                                                         00131
 00091             TRANSFER   ,PROCO                                                      00132
 00092   CLRK10    SEIZE      CLRK10                                                      00133
 00093             ADVANCE    *2,FN$FUN4            TIME TO PROCESS ORDER                 00134
 00094             RELEASE    CLRK10                                                      00135
```

```
BLOCK
NUMBER  *LOC    NAME      A,B,C,D,E,F,G        COMMENTS                              CARD
00095           DEPART    REQ                                                        00136
00096           TRANSFER  ,PROCO                                                     00137
00097   CLRK11  SEIZE     CLRK11                                                     00138
00098           ADVANCE   *2,FN$FUN4           TIME TO PROCESS ORDER                 00139
00099           RELEASE   CLRK11                                                     00140
00100           DEPART    REQ                                                        00141
00101           TRANSFER  ,PROCO                                                     00142
00102   CLRK12  SEIZE     CLRK12                                                     00143
00103           ADVANCE   *2,FN$FUN4           TIME TO PROCESS ORDER                 00144
00104           RELEASE   CLRK12                                                     00145
00105           DEPART    REQ                                                        00146
00106           TRANSFER  ,PROCO                                                     00147
00107   CLRK13  SEIZE     CLRK13                                                     00148
00108           ADVANCE   *2,FN$FUN4           TIME TO PROCESS ORDER                 00149
00109           RELEASE   CLRK13                                                     00150
00110           DEPART    REQ                                                        00151
00111   PROCO   TABULATE  TAB3                                                       00152
00112           TRANSFER  ,PAK                                                       00153
00113   TESTBC  TEST E P3,MODB,MODC                                                  00154
00114   MODB    MARK      5                                                          00155
00115           QUEUE     RES                  COUNT RESERVE ITEMS REQUESTED         00156
00116           TRANSFER  ALL,CLRKR1,CLRKR4,4                                        00157
00117   CLRKR1  SEIZE     CLRKR1                                                     00158
00118           ADVANCE   *2,FN$FUN5           RESERVE ITEM PROCESSING TIME          00159
00119           RELEASE   CLRKR1                                                     00160
00120           TRANSFER  ,PROCR                                                     00161
00121   CLRKR2  SEIZE     CLRKR2                                                     00162
```

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            04/29/74     SPECTRA TO FLOW SIMULATOR INPUT      PAGE    7 (V7)

 BLOCK                                                                            CARD
 NUMBER   *LOC     NAME      A,B,C,D,E,F,G     COMMENTS
 00122             ADVANCE   *2,FN$FUN5        RESERVE ITEM PROCESSING TIME       00163
 00123             RELEASE   CLRKR2                                               00164
 00124             TRANSFER  ,PROCR                                               00165
 00125    CLRKR3   SEIZE     CLRKR3                                               00166
 00126             ADVANCE   *2,FN$FUN5        RESERVE ITEM PROCESSING TIME       00167
 00127             RELEASE   CLRKR3                                               00168
 00128             TRANSFER  ,PROCR                                               00169
 00129    CLRKR4   SEIZE     CLRKR4                                               00170
 00130             ADVANCE   *2,FN$FUN5        RESERVE ITEM PROCESSING TIME       00171
 00131             RELEASE   CLRKR4                                               00172
 00132    PROCR    DEPART    RES                                                  00173
 00133             TABULATE  TAB4                                                 00174
 00134             TERMINATE                   REQUESTED ITEM IS IN CIRCULATION   00175
 00135    MODC     MARK      6                                                    00176
 00136             QUEUE     NIC               COUNT NOT-IN-CATALOG ITEMS REQUESTED 00177
 00137             TRANSFER  ALL,CLRKN1,CLRKN7,4                                  00178
 00138    CLRKN1   SEIZE     CLRKN1                                               00179
 00139             ADVANCE   *2,FN$FUN7        NOT-IN-CAT ITEM PROCESSING TIME    00180
 00140             RELEASE   CLRKN1                                               00181
 00141             TRANSFER  ,PROCN                                               00182
 00142    CLRKN2   SEIZE     CLRKN2                                               00183
 00143             ADVANCE   *2,FN$FUN7        NOT-IN-CAT ITEM PROCESSING TIME    00184
 00144             RELEASE   CLRKN2                                               00185
 00145             TRANSFER  ,PROCN                                               00186
 00146    CLRKN3   SEIZE     CLRKN3                                               00187
 00147             ADVANCE   *2,FN$FUN7        NOT-IN-CAT ITEM PROCESSING TIME    00188
 00148             RELEASE   CLRKN3                                               00189
```

```
              04/29/74      SPECTRA 70 FLOW SIMULATOR INPUT       PAGE    8 (V7)

  BLOCK
  NUMBER    *LOC     NAME       A,B,C,D,E,F,G         COMMENTS                                  CARD
  00149              TRANSFER   ,PROCN                                                          00190
  00150     CLRKN4   SEIZE      CLRKN4                                                          00191
  00151              ADVANCE    *2,FN$FUN7             NOT-IN-CAT ITEM PROCESSING TIME          00192
  00152              RELEASE    CLRKN4                                                          00193
  00153              TRANSFER   ,PROCN                                                          00194
  00154     CLRKN5   SEIZE      CLRKN5                                                          00195
  00155              ADVANCE    *2,FN$FUN7             NOT-IN-CAT ITEM PROCESSING TIME          00196
  00156              RELEASE    CLRKN5                                                          00197
  00157              TRANSFER   ,PROCN                                                          00198
  00158     CLRKN6   SEIZE      CLRKN6                                                          00199
  00159              ADVANCE    *2,FN$FUN7             NOT-IN-CAT ITEM PROCESSING TIME          00200
  00160              RELEASE    CLRKN6                                                          00201
  00161              TRANSFER   ,PROCN                                                          00202
  00162     CLRKN7   SEIZE      CLRKN7                                                          00203
  00163              ADVANCE    *2,FN$FUN7             NOT-IN-CAT ITEM PROCESSING TIME          00204
  00164              RELEASE    CLRKN7                                                          00205
  00165     PROCN    DEPART     NIC                                                             00206
  00166              TABULATE   TAB5                                                            00207
  00167              TERMINATE                         REQUESTED ITEM IS NOT IN MOD CATALOG     00208
            *                                                                                   00209
            * NOT-IN-CATALOG PROCESSING SECTION                                                 00210
            *                                                                                   00211
  00168              GENERATE   1,FN$GENC              REQUESTS FOR ITEMS NOT LISTED IN CATALOG 00212
  00169     NICO     QUEUE      NICO                   COUNT NOT-IN-CATALOG ITEMS SENT OUT      00213
  00170              DEPART     NICO                                                            00214
  00171              TRANSFER   ,PAK                      SEND OUT                              00215
            *                                                                                   00216
```

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             04/29/74     SPECTRA TO FLOW SIMULATOR INPUT     PAGE    9 (V7)

 BLOCK
NUMBER  *LOC    NAME      A,B,C,D,E,F,G          COMMENTS                                CARD
        * ON RESERVE PROCESSING SECTION                                                   00217
        *                                                                                 00218
00172           GENERATE  1,FN$GEND              REQUESTS FOR ITEMS WITH RESERVE WAITS   00219
00173   RESO    QUEUE     RESO                   COUNT RESERVE ITEMS SENT OUT            00220
00174           DEPART    RESO                                                           00221
00175   PAK     MARK      7                                                              00222
00176           QUEUE     PAK                    COUNT OUTGOING PACKAGES                 00223
00177           TRANSFER  ALL,PAKER1,PAKER5,4                                            00224
00178   PAKER1  SEIZE     PAKER1                                                         00225
00179           ADVANCE   1,FN$FUN15            TIME FOR PACKAGING                       00226
00180           RELEASE   PAKER1                                                         00227
00181           TRANSFER  ,PROCPAK                                                       00228
00182   PAKER2  SEIZE     PAKER2                                                         00229
00183           ADVANCE   1,FN$FUN15            TIME FOR PACKAGING                       00230
00184           RELEASE   PAKER2                                                         00231
00185           TRANSFER  ,PROCPAK                                                       00232
00186   PAKER3  SEIZE     PAKER3                                                         00233
00187           ADVANCE   1,FN$FUN15            TIME FOR PACKAGING                       00234
00188           RELEASE   PAKER3                                                         00235
00189           TRANSFER  ,PROCPAK                                                       00236
00190   PAKER4  SEIZE     PAKER4                                                         00237
00191           ADVANCE   1,FN$FUN15            TIME FOR PACKAGING                       00238
00192           RELEASE   PAKER4                                                         00239
00193           TRANSFER  ,PROCPAK                                                       00240
00194   PAKER5  SEIZE     PAKER5                                                         00241
00195           ADVANCE   1,FN$FUN15            TIME FOR PACKAGING                       00242
00196           RELEASE   PAKER5                                                         00243
```

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        04/29/74     SPECTRA 70 FLOW SIMULATOR INPUT      PAGE    10 (V7)

 BLOCK
NUMBER    *LOC     NAME      A,B,C,D,E,F,G       COMMENTS                         CARD
 00197    PROCPAK  DEPART     PAK                                                  00244
 00198             TABULATE   TAB6                                                 00245
 00199             TERMINATE                       PACKAGES IN MAIL                00246
          *                                                                        00247
          TAB2     TABLE M1,1,1,10                                                 00248
          TAB3     TABLE MP4,10,10,10                                              00249
          TAB4     TABLE MP5,10,10,10                                              00250
          TAB5     TABLE MP6,10,10,22                                              00251
          TAB6     TABLE MP7,1,1,10                                                00252
          *                                                                        00253
          * RUN TIMING SECTION                                                     00254
          *                                                                        00255
 00200             GENERATE   480,,,,2                                             00256
 00201             TERMINATE  1                                                    00257
                   START      22                                                   00258
                   END                                                             00259
```

SIMULATION OF ONE MONTH'S OPERATION

NORTH CENTRAL REGIONAL LIBRARY

```
RELATIVE CLOCK TIME:      10560
ABSOLUTE CLOCK TIME:      10560

BLOCK COUNTS
 BLOCK  CURR,   TOTAL    BLOCK  CURR,   TOTAL    BLOCK  CURR,   TOTAL    BLOCK  CURR,   TOTAL    BLOCK  CURR,   TOTAL
     1     0     2901   SESAME     0     2901        3     0     2901   CLRKP1     0     2355        5     0     2355
     6     0     2355        7     0     2355   CLRKP2     0      546        9     0      616       10     0      546
    11     0      546   CLRKP3     0        2       13     0        2       14     0        2       15     0        2
CLRKP4     0        0       17     0        0       18     0        0       19     0        0   CLRKP5     0        0
    21     0        0       22     0        0       23     0        0   CLRKP6     0        0       25     0        0
    26     0        0       27     0        0   CLRKP7     0        0       29     0        0       30     0        0
    31     0        0   CLRKP8     0        0       33     0        0       34     0        0    PROC1     0     2901
    36     0     2901    SHELF     0     2901       38     0     1597       39     0     1597      REG     0     1597
    41     0     1597       42     0     1597  TESTABC     0     1597     MODA     0     1362       45     0     1362
    46     0     1362    CLRK1     0      834       48     1      833       49     0     3460       50     0      833
    51     0      833    CLRK2     0      412       53     1      411       54     0      411       55     0      411
    56     0      411    CLRK3     0       88       58     0       88       59     0       88       60     0       88
    61     0       88    CLRK4     0        8       63     0        8       64     0        8       65     0        4
    66     0        8    CLRK5     0        0       68     0        0       69     0        0       70     0        0
    71     0        0    CLRK6     0        0       73     0        0       74     0        0       75     0        0
    76     0        0    CLRK7     0        0       78     0        0       79     0        0       80     0        0
    81     0        0    CLRK8     0        0       83     0        0       84     0        0       85     0        0
    86     0        0    CLRK9     0        0       88     0        0       89     0        0       90     0        0
    91     0        0   CLRK10     0        0       93     0        0       94     0        0       95     0        0
    96     0        0   CLRK11     0        0       98     0        0       99     0        0      100     0        0
   101     0        0   CLRK12     0        0      103     0        0      104     0        0      105     0        0
   106     0        0   CLRK13     0        0      108     0        0      109     0        0      110     0        0
 PROCD     0     1360      112     0     1360   TESTBC     0      233     MODB     0      163      115     0      163
   116     0      163   CLRKB1     0      145      118     0      145      119     0      145      120     0      145
CLRKB2     0       18      122     0       18      123     0       18      124     0       18   CLRKB3     0        0
   126     0        0      127     0        0      128     0        0   CLRKB4     0        0      130     0        0
   131     0        0    PROCA     0      163      133     0      163      134     0      163     MODC     0       72
```

```
     136     0      72      137   72        0   CLRKN1     0      57      139     1      56      140     0      56
     141     0      36   CLRKN2    0       14      143     0      14      144     0      14      145     0      14
  CLRKN3     0       1      147    0        1      148     0       1      149     0       1   CLRKN4     0       0
     151     0       0      152    0        0      153     0       0   CLRKN5     0       0      155     0       0
     156     0       0      157    0        0   CLRKN6     0       0      159     0       0      160     0       0
     161     0       0   CLRKN7    0        0      163     0       0      164     0       0    PROCN     0      71
     166     0      71      167    0       71      168     0     331     NICO     0     331      170     0     331
     171     0     331      172    0      916     NESO     0     916      174     0     916      PAK     0    2007
     176     0    2607      177 2607        0   PAKER1     0    2126      179     0    2126      180     0    2126
     181     0    2126   PAKER2    0      439      183     0     439      184     0     439      185     0     439
  PAKER3     0      39      187    0       39      188     0      39      189     0      39   PAKER4     0       2
     191     0       2      192    0        2      193     0       2   PAKER5     0       1      195     0       1
     196     0       1  PROCPAK    0     2607      198     0    2607      199     0    2607      200     0      22
     201     0      22
```

```
        RANGE  FACILITY   AVERAGE     NUMBER    AVERAGE    SEIZING  PREEMPTING     RANGE
                  ID   UTLIZATION    ENTRIES TIME/TRANS TRNSACTION TRNSACTION
            1   CLRKP1      0.447      2355      2.006          0          0         1
            2   CLRKP2      0.104       544      2.026          0          0         2
            3   CLRKP3      0.000         2      2.000          0          0         3
            9    CLRK1      0.549       854      6.790        300          0         9
           10    CLRK2      0.254       412      6.517        294          0        10
           11    CLRK3      0.056        88      6.670          0          0        11
           12    CLRK4      0.004         8      4.875          0          0        12
           22   CLRKR1      0.162       145     11.766          0          0        22
           23   CLRKR2      0.023        18     13.444          0          0        23
           26   CLRKW1      0.351        57     64.965        273          0        26
           27   CLRKW2      0.084        14     63.286          0          0        27
           28   CLRKW3      0.006         1     67.000          0          0        28
           33   PAKER1      0.130      2126      0.648          0          0        33
           34   PAKER2      0.029       439      0.695          0          0        34
           35   PAKER3      0.002        39      0.467          0          0        35
           36   PAKER4      0.000         2      0.500          0          0        36
           37   PAKER5                    1      0.000          0          0        37
```

```
RANGE  QUEUE    MAXIMUM  AVERAGE   TOTAL   ZERO   %-ZERO   AVERAGE  NZ-AVERAGE  TABLE  CURRENT  RANGE
          ID   CONTENTS CONTENTS  ENTRIES ENTRIES ENTRIES TIME/TRANS TIME/TRANS  NUMBER CONTENTS.
    1  RETURN      3   [illegible]  2901      0      .00     2.009      2.009      0      0        1
    2 INORDERS     1     0.000      1597   1597   100.00     0.000      0.000      0      0        2
    3     RED      4     0.863      1362    251    18.42     6.692      8.204      0      2        3
    4     RES      2     0.184       163      0      .00    11.931     11.931      0      0        4
    5     VIC      3     0.441        72      0      .00    64.667     64.667      0      1        5
    6    NICD      1     0.000       331    331   100.00     0.000  [illegible]    0      3        6
    7    RESD      1     0.000       916    916   100.00     0.000      0.000      0      0        7
    8     PAK      3     0.161      2607   1751    67.16     2.653      1.988      0      0        8
```

```
TABLE NUMBER          1

ENTRIES IN TABLE       MEAN ARGUMENT        STANDARD DEVIATION        SUM OF ARGUMENTS
        2901                2.009                      0.541              5829.002 NON-WEIGHTED

          UPPER       OBSERVED      PER CENT      CUMULATIVE     CUMULATIVE     MULTIPLE            DEVIATION
          LIMIT       FREQUENCY     OF TOTAL      PERCENTAGE      REMAINDER      OF MEAN            FROM MEAN
              1            411         14.17           14.17          85.83        0.498               1.865-
              2           2052         70.73           84.90          15.10        0.995                .017-
              3            438         15.10          100.00            .00        1.493               1.831
              4              0           .00          100.00            .00        1.991               3.679
              5              0           .00          100.00            .00        2.488               5.528
              6              0           .00          100.00            .00        2.986               7.376
              7              0           .00          100.00            .00        3.484               9.225
              8              0           .00          100.00            .00        3.981              11.073
              9              0           .00          100.00            .00        4.479              12.921
             10              0           .00          100.00            .00        4.977              14.770
REMAINING FREQUENCIES ARE ALL ZERO
```

```
TABLE NUMBER          2

ENTRIES IN TABLE        MEAN ARGUMENT        STANDARD DEVIATION        SUM OF ARGUMENTS
       1360                   6.699                    5.748                 9110.001 NON-WEIGHTED

        UPPER     OBSERVED     PER CENT     CUMULATIVE     CUMULATIVE     MULTIPLE         DEVIATION
        LIMIT     FREQUENCY    OF TOTAL     PERCENTAGE     REMAINDER      OF MEAN          FROM MEAN
           10          1121       82.43          82.43          17.57        1.493             0.574
           20           179       13.16          95.59           4.41        2.986             2.313
           30            57        4.19          99.78            .22        4.479             4.053
           40             3         .22         100.00            .00        5.971             5.793
           50             0         .00         100.00            .00        7.464             7.532
           60             0         .00         100.00            .00        8.957             9.272
           70             0         .00         100.00            .00       10.450            11.012
           80             0         .00         100.00            .00       11.943            12.751
           90             0         .00         100.00            .00       13.436            14.491
          100             0         .00         100.00            .00       14.929            16.230
REMAINING FREQUENCIES ARE ALL ZERO
```

TABLE NUMBER 8

ENTRIES IN TABLE	MEAN ARGUMENT	STANDARD DEVIATION	SUM OF ARGUMENTS
163	11.951	9.806	1948.000 NON-WEIGHTED

UPPER LIMIT	OBSERVED FREQUENCY	PER CENT OF TOTAL	CUMULATIVE PERCENTAGE	CUMULATIVE REMAINDER	MULTIPLE OF MEAN	DEVIATION FROM MEAN
10	101	61.96	61.96	38.04	0.837	.199-
20	34	20.86	82.82	17.18	1.674	0.820
30	16	9.82	92.64	7.36	2.510	1.840
40	11	6.75	99.39	.61	3.347	2.860
50	1	.61	100.00	.00	4.184	3.880
60	0	.00	100.00	.00	5.021	4.900
70	0	.00	100.00	.00	5.857	5.920
80	0	.00	100.00	.00	6.694	6.940
90	0	.00	100.00	.00	7.531	7.960
100	0	.00	100.00	.00	8.368	8.980

REMAINING FREQUENCIES ARE ALL ZERO

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TABLE NUMBER          9

ENTRIES IN TABLE       MEAN ARGUMENT        STANDARD DEVIATION       SUM OF ARGUMENTS
              71              65.577                    38.236                4656.003 NON-WEIGHTED

          UPPER      OBSERVED      PER CENT    CUMULATIVE    CUMULATIVE    MULTIPLE               DEVIATION
          LIMIT     FREQUENCY      OF TOTAL    PERCENTAGE     REMAINDER     OF MEAN               FROM MEAN
             10             5          7.04          7.04         92.96       0.152                  1.452-
             20             4          5.63         12.68         87.33       0.305                  1.191-
             30             1          1.41         14.08         85.92       0.457                   .929-
             40            10         14.08         28.17         71.83       0.610                   .668-
             50             4          5.63         33.80         66.20       0.762                   .407-
             60            12         16.90         50.70         49.30       0.915                   .145-
             70             9         12.68         63.38         36.62       1.067                  0.115
             80             7          9.86         73.24         26.76       1.220                  0.377
             90             4          5.63         78.87         21.13       1.372                  0.638
            100             2          2.82         81.69         18.32       1.525                  0.899
            110             2          2.82         84.50         15.50       1.677                  1.161
            120             4          5.63         90.13          9.87       1.830                  1.422
            130             2          2.82         92.95          7.05       1.982                  1.683
            140             1          1.41         94.36          5.64       2.135                  1.[illegible]5
            150             2          2.82         97.17          2.83       2.287                  2.206
            160             1          1.41         98.58          1.42       2.440                  2.468
            170             1          1.41         99.99           .01       2.592                  2.729
            180             0           .00         99.99           .01       2.745                  2.990
            190             0           .00         99.99           .01       2.897                  3.252
            200             0           .00         99.99           .01       3.050                  3.513
            210             0           .00         99.99           .01       3.202                  3.775
            220             0           .00         99.99           .01       3.355                  4.036
REMAINING FREQUENCIES ARE ALL ZERO
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TABLE NUMBER          3

ENTRIES IN TABLE      MEAN ARGUMENT       STANDARD DEVIATION      SUM OF ARGUMENTS
            2607             0.653                     1.129            1702.000 NON-WEIGHTED

          UPPER      OBSERVED      PER CENT     CUMULATIVE     CUMULATIVE    MULTIPLE          DEVIATION
          LIMIT     FREQUENCY      OF TOTAL     PERCENTAGE      REMAINDER     OF MEAN          FROM MEAN
              1          2128         81.63          81.63          18.37       1.532              0.307
              2           235          9.01          90.64           9.36       3.063              1.193
              3           151          5.79          96.43           3.57       4.595              2.078
              4            63          2.42          98.85           1.15       6.127              2.964
              5            30          1.15         100.00            .00       7.659              3.849
              6             0           .00         100.00            .00       9.190              4.735
              7             0           .00         100.00            .00      10.722              5.620
              8             0           .00         100.00            .00      12.254              6.506
              9             0           .00         100.00            .00      13.786              7.392
             10             0           .00         100.00            .00      15.317              8.277
REMAINING FREQUENCIES ARE ALL ZERO
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AUUL 0 72

SIMULATION OF ONE MONTH'S OPERATION

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                         SIMULATION OF ONE CENTER FOR ALL STATE

RELATIVE CLOCK TIME:        10560
ABSOLUTE CLOCK TIME:        10560

BLOCK COUNTS
  BLOCK  CURR,   TOTAL   BLOCK  CURR,   TOTAL   BLOCK  CURR,   TOTAL   BLOCK  CURR,   TOTAL   BLOCK  CURR,   TOTAL
      1     0    25537  SESAME     0    25537       3     0    25537  CLRKP1     0     4062       5     0     4062
      6     0     4062       7     0     4062  CLRKP2     0     3686       9     0     3686      10     0     5141
     11     0     3586  CLRKP3     0     3250      13     0     3250      14     0     3250      15     0     3250
 CLRKP4     0     2850      17     0     2850      18     0     2850      19     0     2850  CLRKP5     0     2490
     21     0     2490      22     0     2490      23     0     2490  CLRKP6     0     2147      25     0     2147
     26     0     2147      27     0     2147  CLRKP7     0     1847      29     0     1847      30     0     1847
     31     0     1847  CLRKP8     0     1594      33     0     1594      34     0     1594      35     0     1594
 CLRKP9     0     1381      37     0     1381      38     0     1381      39     0     1840 CLRKP10     0     1212
     41     0     1212      42     0     1212      43     0     1212 CLRKP11     0     1018      45     0     1018
     46     0     1018   PROC1     0    25537      48     0    25537   SHELF     0    25537      50     0    14770
     51     0    14770     REQ     0    14770      53     0    14770      54     0    14770 TESTABC     0    14770
   MODA     0    12856      57     0    12856      58     0    12856   CLRK1     0     1412      60     1     1411
     61     0     1411      62     0     1411      63     0     1411   CLRK2     0     1298      65     1     1297
     66     0     1297      67     0     1297      68     0     1297   CLRK3     0     1270      70     0     1270
     71     0     1270      72     0     1270      73     0     1270   CLRK4     0     1218      75     1     1217
     76     0     1217      77     0     1217      78     0     1217   CLRK5     0    24964      80     1     1189
     81     0     1189      82     0     1189      83     0     1189   CLRK6     0     1055      85     1     1054
     86     0     1034      87     0     1034      88     0     1034   CLRK7     0      958      90     1      957
     91     0      937      92     0      937      93     0      937   CLRK8     0      883      95     1      882
     96     0      882      97     0      882      98     0      882   CLRK9     0      790     100     0      790
    101     0      790     102     0      790     103     0      790  CLRK10     0      683     105     0      683
    106     0      683     107     0      683     108     0      683  CLRK11     0      563     110     0      563
    111     0      563     112     0      563     113     0      563  CLRK12     0      519     115     0      519
    116     0      519     117     0      519     118     0      519  CLRK13     0      391     120     0      391
    121     0      391     122     0      391     123     0      391  CLRK14     0      327     125     0      327
    126     0      327     127     0      327     128     0      327  CLRK15     0      299     130     0      299
    131     0      299     132     0      299   PROCO     0    12849     134     0    12849  TESTBC     0     1914
   MODB   0   1435     137     0   1435     138  1653      0  CLRKR1   0    360     140   1    959
    141   0    959     142     0    959  CLRKR2     0    403     144   0    403     145   0    403
    146   0    403  CLRKR3     0    271     148     0    271     149   0    271     150   0    271
 CLRKR4   0    133     152     0    133     153     0    133     154   0    133  CLRKR5   0     59
    156   1     98     157     0     58     158     0     58  CLRKR6   0     29     160   0     29
    161   0     29   PRICR     0   1453     163     0   1453     164   0   1453    MODC   0    459
    166   0    459     167   459      0  CLRKN1     0    124     169   0    124     170   0    124
    171   0    124  CLRKN2     0    111     173     1    110     174   0    110     175   0    110
 CLRKN3   0     84     177     0     84     178     0     84     179   0     84  CLRKN4   0     65
    181   0     65     182     0     65     183     0     15  CLRKN5   0     37     185   0     37
    186   0     47     187     0     37  CLRKN6     0     23     189   0     23     190   0     23
    191   0     23  CLRKN7     0     13     193     0     13     194   0     13   PRCCN   0    458
    196   0    438     197     0    438     198     0   2316    MICO   0   2316     200   0   2316
    201   0   2316     202     0   8409    RESD     0   8409     204   0   8409     PAK   0  23774
    206   0  23774     207 23774      0  PAKER1     0   7736     209   1   7733     210   0   7733
    211   0   7733  PAKER2     0   6337     213     1   6336     214   0   6336     215   0   6336
 PAKER3   0   4869     217     0   4869     218     0   4869     219   0   4869  PAKER4   0   3097
    221   1   3096     222     0   3096     223     0   3096  PAKER5   0   1715     225   0   1715
    226   0   1715 PRDCPAK     0  23771     228     0  23771     229   0  23771     230   0     22
    231   0     22
 RANGE  FACILITY    AVERAGE     NUMBER    AVERAGE    SEIZING PREEMPTING    RANGE
            ID UTLIZATION    ENTRIES TIME/TRANS TRNSACTION TRNSACTION
     1   CLRKP1       0.769       4042      1.998          0          0        1
     2   CLRKP2       0.699       3686      2.004          0          0        2
     3   CLRKP3       0.617       3250      2.003          0          0        3
     4   CLRKP4       0.538       2830      1.994          0          0        4
     5   CLRKP5       0.471       2490      1.999          0          0        5
     6   CLRKP6       0.410       2147      2.016          0          0        6
     7   CLRKP7       0.349       1847      1.996          0          0        7
     8   CLRKP8       0.302       1594      1.999          0          0        8
     9   CLRKP9       0.262       1381      2.002          0          0        9
    10   CLRKP10      0.232       1212      2.025          0          0       10
    11   CLRKP11      0.195       1018      2.020          0          0       11
    12    CLRK1       0.883       1412      6.405        755          0       12
    13    CLRK2       0.852       1298      6.929        620          0       13
    14    CLRK3       0.828       1270      6.887          0          0       14
    15    CLRK4       0.773       1218      6.696        824          0       15
    16    CLRK5       0.728       1190      6.462        724          0       16
    17    CLRK6       0.700       1055      7.010        955          0       17
    18    CLRK7       0.637        938      7.022        953          0       18
    19    CLRK8       0.572        883      6.843        853          0       19
    20    CLRK9       0.501        790      6.691          0          0       20
    21   CLRK10       0.434        683      6.716          0          0       21
    22   CLRK11       0.368        563      6.906          0          0       22
    23   CLRK12       0.322        519      6.551          0          0       23
    24   CLRK13       0.237        391      6.414          0          0       24
    25   CLRK14       0.213        327      6.890          0          0       25
    26   CLRK15       0.175        299      6.197          0          0       26
    27   CLRKR1       0.603        560     11.368        916          0       27
    28   CLRKR2       0.448        403     11.749          0          0       28
    29   CLRKR3       0.275        271     10.708          0          0       29
```

```
RANGE  FACILITY   AVERAGE    NUMBER   AVERAGE    SEIZING  PREEMPTING   RANGE
             ID UTLIZATION   ENTRIES TIME/TRANS TRNSACTION TRNSACTION
   30  CLRKR4       0.138       133    10.992          0          0      30
   31  CLRKR3       0.064        39    11.390        474          0      31
   32  CLRKR6       0.033        29    12.000          0          0      32
   33  CLRKN1       0.710       124    60.435          0          0      33
   34  CLRKN2       0.609       111    57.955        947          0      34
   35  CLRKN3       0.486        84    61.131          0          0      35
   36  CLRKN4       0.387        65    62.800          0          0      36
   37  CLRKN5       0.227        37    64.703          0          0      37
   38  CLRKN6       0.148        25    62.720          0          0      38
   39  CLRKN7       0.098        13    79.846          0          0      39
   40  PAKER1       0.484      7736     0.661        703          0      40
   41  PAKER2       0.408      6357     0.678        476          0      41
   42  PAKER3       0.296      4869     0.643          0          0      42
   43  PAKER4       0.198      3097     0.675        630          0      43
   44  PAKER5       0.117      1715     0.720          0          0      44
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RANGE   QUEUE   MAXIMUM   AVERAGE    TOTAL     ZERO   %ZEROS   AVERAGE  $AVERAGE    TABLE  CURRENT   RANGE
           ID  CONTENTS  CONTENTS  ENTRIES  ENTRIES  ENTRIES TIME/TRANS TIME/TRANS  NUMBER CONTENTS
    1  RETURN        37     5.466    23337        0      .00     2.261     2.261       0       0       1
    2 INGRIEAS        1     0.000    14770    14770   100.00     0.000     0.000       0       0       2
    3     RES        36     8.477    12836     2090    16.25     6.963     8.315       0       7       3
    4     RES         8     1.369     1455        0      .00    11.388    11.388       0       2       4
    5     MIS        13     2.709      439        0      .00    62.233    62.233       0       1       5
    6    NICU         1     0.000     2316     2316   100.00     0.000     0.000       0       0       6
    7    ARSD         1     0.000     8409     8409   100.00     0.000     0.000       0       3       7
    8     PAA        16     1.323    23774    17030    64.38     0.676     2.020       0       3       8
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```
TABLE NUMBER          1

ENTRIES IN TABLE      MEAN ARGUMENT       STANDARD DEVIATION        SUM OF ARGUMENTS
           25537              2.261                    0.848        57748.002 NON-WEIGHTED

           UPPER      OBSERVED      PER CENT     CUMULATIVE     CUMULATIVE     MULTIPLE           DEVIATION
           LIMIT     FREQUENCY      OF TOTAL     PERCENTAGE      REMAINDER      OF MEAN           FROM MEAN
               1          3148         12.33          12.33          87.67        0.442              1.486-
               2         15210         59.56          71.89          28.11        0.884               .308-
               3          5254         20.57          92.46           7.54        1.327              0.870
               4          1375          5.38          97.83           2.16        1.769              2.049
               5           427          1.67          99.52            .48        2.211              3.227
               6            83           .33          99.84            .16        2.653              4.406
               7            35           .14          99.98            .02        3.096              5.584
               8             5           .02         100.00            .00        3.538              6.763
               9             0           .00         100.00            .00        3.980              7.942
              10             0           .00         100.00            .00        4.422              9.120
REMAINING FREQUENCIES ARE ALL ZERO
```

```
TABLE NUMBER          2

ENTRIES IN TABLE      MEAN ARGUMENT        STANDARD DEVIATION        SUM OF ARGUMENTS
          12849                6.966                    5.703            89510.019 NON-WEIGHTED

          UPPER      OBSERVED       PER CENT      CUMULATIVE      CUMULATIVE      MULTIPLE           DEVIATION
          LIMIT      FREQUENCY      OF TOTAL      PERCENTAGE      REMAINDER       OF MEAN            FROM MEAN
             10          10433         81.20           81.20           18.80         1.435                0.531
             20           1930         15.02           96.22            3.78         2.871                2.285
             30            464          3.61           99.83             .17         4.306                4.038
             40             22           .17          100.00             .00         5.742                5.792
             50              0           .00          100.00             .00         7.177                7.545
             60              0           .00          100.00             .00         8.613                9.299
             70              0           .00          100.00             .00        10.048               11.052
             80              0           .00          100.00             .00        11.484               12.805
             90              0           .00          100.00             .00        12.919               14.559
            100              0           .00          100.00             .00        14.355               16.312
 REMAINING FREQUENCIES ARE ALL ZERO
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TABLE NUMBER          3

ENTRIES IN TABLE       MEAN ARGUMENT         STANDARD DEVIATION          SUM OF ARGUMENTS
            1453             11.388                     8.871                16547.001 NON-WEIGHTED

          UPPER      OBSERVED       PER CENT     CUMULATIVE     CUMULATIVE     MULTIPLE              DEVIATION
          LIMIT     FREQUENCY       OF TOTAL     PERCENTAGE      REMAINDER      OF MEAN              FROM MEAN
             10           921          63.39          63.39          36.61        0.878                  .156-
             20           346          23.81          87.20          12.80        1.756                  0.970
             30           126           8.67          95.87           4.13        2.634                  2.097
             40            41           2.82          98.69           1.31        3.512                  3.225
             50            14            .96          99.65            .35        4.391                  4.352
             60             2            .14          99.79            .21        5.269                  5.479
             70             3            .21         100.00            .00        6.147                  6.606
             80             0            .00         100.00            .00        7.025                  7.733
             90             0            .00         100.00            .00        7.903                  8.861
            100             0            .00         100.00            .00        8.781                  9.988
REMAINING FREQUENCIES ARE ALL ZERO
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TABLE NUMBER        9

ENTRIES IN TABLE      MEAN ARGUMENT      STANDARD DEVIATION      SUM OF ARGUMENTS
           458              62.343                  36.702          28553.003 NON-WEIGHTED

      UPPER     OBSERVED     PER CENT    CUMULATIVE    CUMULATIVE    MULTIPLE          DEVIATION
      LIMIT    FREQUENCY     OF TOTAL    PERCENTAGE     REMAINDER     OF MEAN          FROM MEAN
         10           12         2.62          2.62         97.38       0.160             1.426-
         20           29         6.33          8.95         91.05       0.321             1.153-
         30           44         9.61         18.56         81.44       0.481              .881-
         40           63        13.76         32.31         67.69       0.642              .608-
         50           53        11.57         43.88         56.12       0.802              .336-
         60           59        12.88         56.77         43.23       0.962              .063-
         70           46        10.04         66.81         33.19       1.123              0.208
         80           31         6.77         73.58         26.42       1.283              0.481
         90           30         6.55         80.13         19.87       1.444              0.753
        100           21         4.59         84.71         15.29       1.604              1.026
        110           17         3.71         88.42         11.58       1.764              1.298
        120           13         2.84         91.26          8.74       1.925              1.570
        130           13         2.84         94.10          5.90       2.085              1.843
        140           12         2.62         96.72          3.28       2.246              2.115
        150            6         1.31         98.03          1.97       2.406              2.388
        160            3          .66         98.68          1.32       2.566              2.660
        170            3          .66         99.34           .66       2.727              2.933
        180            1          .22         99.56           .44       2.887              3.205
        190            0          .00         99.56           .44       3.048              3.478
        200            0          .00         99.56           .44       3.208              3.750
        210            0          .00         99.56           .44       3.368              4.023
        220            2          .44         99.99           .01       3.529              4.295
REMAINING FREQUENCIES ARE ALL ZERO
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TABLE NUMBER          3

ENTRIES IN TABLE        MEAN ARGUMENT         STANDARD DEVIATION         SUM OF ARGUMENTS
           23771                0.678                      1.157           16107.003 NON-WEIGHTED

           UPPER       OBSERVED        PER CENT      CUMULATIVE      CUMULATIVE      MULTIPLE              DEVIATION
           LIMIT      FREQUENCY        OF TOTAL      PERCENTAGE       REMAINDER       OF MEAN              FROM MEAN
               1          19261           80.94           80.94           19.06         1.476                  0.278
               2           2143            9.02           89.97           10.03         2.952                  1.143
               3           1380            5.81           95.77            4.23         4.427                  2.007
               4            761            3.20           98.97            1.03         5.903                  2.872
               5            243            1.02           99.99             .01         7.379                  3.737
               6              0             .00           99.99             .01         8.855                  4.601
               7              1             .00          100.00             .00        10.331                  5.466
               8              0             .00          100.00             .00        11.807                  6.331
               9              0             .00          100.00             .00        13.282                  7.195
              10              0             .00          100.00             .00        14.758                  8.060
REMAINING FREQUENCIES ARE ALL ZERO
```